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ABSTRACT

In February 1974, Parts I and II of a study of the Costs of Education in the Health Professions were submitted to the Congress and the Department of Health, Education and Welfare. The report was in response to a request contained in the Comprehensive Health Manpower and Training Act (Public Law 92-157). This volume, part III of the report, contains a detailed description of the methodology used in developing and analyzing the data contained in the study. Part III includes a description of the methodology used in the field study of 82 sampled schools and the process and results of the constructed costs modeling seminars held for the professions of medicine, dentistry, and veterinary medicine. Discussed in the two sections of the report are: (1) Education Costs and New Education Expenditures: The Program Cost Approach; and (2) The Constructed Cost Process. Attachments include statistical tables, sample questionnaires, seminar proceedings, and seminar participants. (Author/PG)

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ED104289

INSTITUTE OF MEDICINE

REPORT OF A STUDY

Costs of Education in the Health Professions

PART III

April 1974

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EDUCATION & WELFARE
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The members of the committee appointed to conduct the project and prepare the report were selected for recognized competence and with due consideration for the balance of disciplines appropriate to the project. Responsibility for the substantive aspects of the report rests with that committee.

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INSTITUTE OF MEDICINE

April 25, 1974

The Honorable Harrison A. Williams, Jr.
Chairman
Committee on Labor & Public Welfare
United States Senate
Washington, D.C. 20510

Dear Chairman Williams:

I am pleased to present to the Senate Committee on Labor and Public Welfare Part III of a report on a study undertaken by the Institute of Medicine of the National Academy of Sciences to determine the national average annual per student costs of education in eight health professions. The study was performed under a contract with the Department of Health, Education, and Welfare pursuant to the provisions of the Comprehensive Health Manpower Training Act of 1971. Parts I and II of the report containing the findings on the costs of education for each of the eight professions were transmitted to you on February 26, 1974.

Part III transmitted today contains a description of the methodology used by the study group to develop the data and analyze the costs of education reported in Parts I and II.

We shall be glad to discuss the report in greater detail with the members and staff of your committee.

Sincerely yours,

Roger J. Bulger

Roger J. Bulger, M.D.
Executive Officer

Enclosure

NATIONAL ACADEMY OF SCIENCES
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INSTITUTE OF MEDICINE

April 25, 1974

The Honorable Harley O. Staggers
Chairman
Committee on Interstate and Foreign Commerce
United States House of Representatives
Washington, D.C. 20515

Dear Chairman Staggers:

I am pleased to present to the House Committee on Interstate and Foreign Commerce Part III of a report on a study undertaken by the Institute of Medicine of the National Academy of Sciences to determine the national average annual per student costs of education in eight health professions. The study was performed under a contract with the Department of Health, Education, and Welfare pursuant to the provisions of the Comprehensive Health Manpower Training Act of 1971. Parts I and II of the report containing the findings on the costs of education for each of the eight professions were transmitted to you on February 26, 1974.

Part III transmitted today contains a description of the methodology used by the study group to develop the data and analyze the costs of education reported in Parts I and II.

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Enclosure

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
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INSTITUTE OF MEDICINE

April 25, 1974

The Honorable Caspar W. Weinberger
Secretary of Health, Education, and
Welfare
North Building, Room 5246
330 Independence Avenue, S.W.
Washington, D.C. 20201

My dear Mr. Secretary:

I am pleased to present to the Department of Health, Education, and Welfare Part III of a report on a study undertaken by the Institute of Medicine of the National Academy of Sciences to determine the national average annual per student costs of education in eight health professions. The study was performed under a contract with the Department of Health, Education, and Welfare pursuant to the provisions of the Comprehensive Health Manpower Training Act of 1971. Parts I and II of the report containing the findings on the costs of education for each of the eight professions were transmitted to you on February 26, 1974.

Part III transmitted today contains a description of the methodology used by the study group to develop the data and analyze the costs of education reported in Parts I and II.

We shall be glad to discuss the report in greater detail with your staff.

Sincerely yours,

Roger J. Bulger

Roger J. Bulger, M.D.
Executive Officer

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Study of the Costs of Education in the Health Professions

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Preface

In February 1974, Parts I and II of a study of the Costs of Education in the Health Professions were transmitted to the Congress and the Department of Health, Education, and Welfare. The report was in response to a request contained in the Comprehensive Health Manpower and Training Act of 1971 (Public Law 92-157).

This volume, Part III, of the report contains a detailed description of the methodology used in developing and analyzing the data contained in the study. Part III includes a description of the methodology used in the field study of 82 sampled schools and the process and results of the constructed costs modeling seminars held for the professions of medicine, dentistry, and veterinary medicine.

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INTRODUCTION

In the Comprehensive Health Manpower Training Act of 1971, Congress requested a study to estimate the average annual cost of educating a student to the first professional degree in each of eight health professions. The study, undertaken by the Institute of Medicine of the National Academy of Sciences, also was to develop a recommendation for the use of the cost data for Federal capitation payments in support of health professional education. Parts I and II of the report of that study provide the data and recommendations requested by Congress, along with a brief description of the study methodology. Part III presents a more detailed explanation of the methodology and some of the findings that led to the final cost estimates.

Existing financial data on health professional schools is of limited usefulness for the purpose of determining the costs of educating students to the first degree. Aggregate income and expenditures for the schools of each profession were shown in Chapter 2, Part II of this report. Some of these data are published regularly but several professions undertook special surveys to obtain information for use by the Institute's study. The data, however, indicate "cash flows" of the schools and are not an adequate measure of the resource costs that must be ascertained to enable an estimate of education program costs. In addition, aggregate data are not translatable into estimates of costs per student. Some other education program cost studies published in recent years would seem to provide a portion of the information needed for this study but their differing methodologies make meaningful comparisons difficult, even among schools in the same profession.*

In an effort to remedy these inadequacies of information, the Institute's study group developed a methodology based on analysis of faculty activities. The entire procedure used by the study group to estimate annual average education costs per student was a combination of three processes:

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*See, for example, Thomas J. Campbell, *Program Cost Allocation in Seven Medical Centers: A Pilot Study* (Washington: Association of American Medical Colleges (AAMC), 1968); Augustus J. Carroll, *Program Cost Estimating in a Teaching Hospital* (Washington: AAMC, 1969); John Koehler and Robert Slighton, *Activity Analysis and Cost Analysis in Medical Schools* (Santa Monica, California: July, 1972); Warren W. Gulko, *Program Classification Structures* (Boulder, Colorado: National Center for Higher Education Management Systems at Western Interstate Commission for Higher Education, 1972); and AAMC, *Undergraduate Medical Education: Elements-Objectives-Cost* (Washington: AAMC, 1973).

Program cost allocation, which identified the total resources used by a school or health science center, and apportioned the cost of the resources among three major programs--education, research, and patient care--on a consistent basis.

Constructed cost seminars in medicine, dentistry, and veterinary medicine, in which experienced educators and administrators reached a consensus of judgments necessary to define the components of an education program.

Income and expenditure analysis for the determination of net education expenditures, which are the full costs of the education program less reimbursements for those portions of research and patient care considered essential to education. Although not a cost concept of classic economics, net education expenditures facilitate the use of education cost figures in identifying the financing required by a school.

With a methodology based on these three processes, the study group conducted detailed analyses at a nationwide sample of 82 schools, selected as nearly as possible to be representative of the total population of schools in each profession.

The study group chose the academic year of 1972-73 as the period for which to compute the average historical costs of educating health professionals, as requested by Congress. Average education costs are based on data collected at the sampled schools, adjusted according to some of the judgmental definitions of education programs that emerged from the constructed cost seminars. The study group concluded that net education expenditures are a suitable basis for establishing the amounts of Federal capitation grants to health professional schools.

The study group believes that the procedures used and the results obtained in this study, while not completely free of error, represent a significant advance in program cost finding techniques as applied to academic health centers, and provide a valid basis for determining levels of financing for education programs. The major assumptions and judgments required by the methodology are explicitly defined and clearly identifiable, enabling a recomputation of the results if different assumptions and judgments are desired.

Chapter 1, contains a detailed explanation of the study methodology, and a description of the sampling techniques used in the study.

Procedures and results of the constructed cost seminars are presented in Chapter 2.

Chapter 1

EDUCATION COSTS AND NET EDUCATION EXPENDITURES: THE PROGRAM COST APPROACH

The procedures used in this study are presented in the sequence of aggregating the costs of all instruction activities, developing education costs, and deriving net education expenditures.

Costs of Instructional Activities

Instructional activities are those that contribute solely to the education programs of a health professional school. They include direct teaching activities, such as lectures and seminars; a portion of the "joint" activities that result simultaneously in instruction and research or patient care; and an appropriate portion of activities, such as administration and professional development, that support all programs.

The costs of instructional activities approximate the incremental costs that an existing health center would incur in establishing an educational program. Instruction costs represent the portion of a health center's costs that are exclusively related to education but do not represent total education costs. The costs of instruction activities are developed according to the following program cost allocation procedures:

First, the principal programs and cost categories are identified. For example, the principal program at a health science center might be:

- medical student education

- dental student education

- education of other types of students

- biomedical research

- patient care.

The cost categories are broadly divided into direct and indirect costs. Direct costs are expenditures incurred by the departments, such as faculty costs, supplies, and expenses; indirect costs include those general administrative and institutional items that support all programs, such as the vice president's office, data processing, and library costs.

The second step is to identify all the resources used by the institution to conduct the programs. Generally, these resources will include personnel (faculty, support, and administrative); facilities and equipment (classrooms, libraries, and laboratories); and overhead services (dean's office, computer processing, and utilities). Costs, whether actual or imputed, must be associated with each resource.

The third step is to identify each organization's personnel, facilities and equipment, and overhead costs that clearly may be assigned to only one program. For example, salary costs of full-time laboratory assistants who engage only in research are costs of the research program.

Fourth, for those costs that reflect contributions to more than one program, guidelines must be developed to allocate portions of costs to programs. Large amounts of a health science center's resources are consumed in activities supporting more than one program, therefore a large part of total costs are subject to these allocation rules. The determination of allocation rules is the essence of program cost estimating in a health science center.

Fifth, program costs for an institution are aggregated at four levels--individual department, basic science and clinical disciplines, each health professional school, and all schools that comprise a health science center. The structure is simplified in schools that are not departmentalized and in freestanding schools; for example, a freestanding school of optometry not divided into departments would have a single level of aggregation.

Sixth, to compute costs on a per student basis, instruction costs for first degree students are divided by the number of students.

The following sections discuss in detail the procedures used for defining the program cost structure and allocating each cost element to programs.

A. Defining Programs and Cost Categories

Programs can be defined in varying degrees of detail. The study group visited one school that allocated its resources among 42 programs, which was useful for the school's administration but excessively itemized for the purposes of this study.

Two groups had developed program definitions for health science centers prior to the Institute's study. The AAMC developed "Guidelines for Academic Health Center Cost Allocation Studies" in 1971, which proposed a program cost structure that has been used by many medical schools; and the Western Interstate Commission for Higher Education (WICHE) developed a program classification structure that is intended to apply to all institutions of higher education, including health science centers.

The study group believed it was important to draw on the experience of these groups and to limit the number of different program definitions in use. As a result, the program definitions and cost categories proposed by the study group rely heavily on the AAMC guidelines, and are compatible with those offered by WICHE.

Tables 1 and 2 display the program cost structure for direct and indirect costs. The cost categories used in the study are adapted from the American Council on Education cost categories used by most institutions of higher education.

B. Allocating Direct Costs to Programs

Because most health professional schools treat the department as the basic unit for budgeting and recording expenditures, the department is the lowest level of aggregation for allocating direct costs to programs. In smaller schools that find it sufficient to treat the entire school as a single cost center, without dividing into departments, the study used the school's cost center as the basic accounting unit. Allocation criteria for each direct cost element are outlined below.

1. Faculty Costs

In almost all schools, faculty costs are the largest single component of direct costs and also the most significant element of the school's total cost because faculty activities govern most other costs. The remaining discussion of allocating faculty costs to programs is presented in four stages--determining how faculty spend their time, (faculty activity reporting); assigning activities to programs; determining total faculty costs; and allocating faculty costs to programs.

Faculty Activity Reporting. The methodology allocates faculty costs to programs in accordance with the proportion of faculty time in hours devoted to each program. Faculty activities were recorded during a one-week period in the spring of 1973. Activity data were obtained from all full-time and part-time faculty and approximately a one-third sample of volunteer faculty.*

The study group evaluated several major alternatives by means of pilot studies before deciding on the faculty activity methodology. The alternatives included faculty reports of "effort" spent on various programs, using only a sample of faculty for activity analysis, and using various reporting periods of a day, semester, or quarter, or academic year. Activity reporting for one week was selected as the most objective and explicit procedure for assigning activities to programs. It allowed for grouping activities according to different definitions of education costs, and the one-week reporting

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*Imputed costs for volunteer faculty time are not included in the costs presented in this report because of the difficulty of accurately measuring their time and their varied functions for assigning that time to programs.

TABLE 1

Program Cost Structure - Direct Costs
School of Dentistry
Department of Dental Clinics

Direct cost categories	Total costs	Instruction					
		Dental students	House officers	Graduate students	Other students	Research	Patient service
1. Personnel costs							
a. faculty							
b. non-faculty							
- secretarial/ clerical							
- technical							
- professional							
- other							
2. Other direct costs							
a. employee benefits							
b. supplies and expenses							
c. equipment							
d. other							

TABLE 2

Program Cost Structure - Indirect Costs
School of Dentistry

Indirect cost categories	Total costs	Instruction				Research	Patient service
		Dental students	House officers	Graduate students	Other students		
Indirect costs							
1. General administration							
2. General institutional							
3. Indirect staff benefits							
4. Library							
5. Plant operations and maintenance							
6. Student services							
7. Extension and public service							
8. Auxiliary enterprises							
9. Medical center assessment							
10. University assessment							
Imputed costs							
1. Depreciation							

period produced adequate data without exceeding the time limit for the study.

At the sampled schools, the study group requested faculty to keep records of time spent in various activities for one week of the 1973 spring semester. As a check on the validity of using a single week's data, a follow-up analysis was undertaken at a small sample of schools during the 1973 fall semester; it disclosed little aggregate difference in education costs.*

Faculty members were sent a package consisting of:

- a letter from the Institute of Medicine requesting their participation
- notification from the school, generally through the Dean's office, specifying such things as the sample week, and scheduled meetings
- a sample of a completed form
- a general information sheet and several blank forms for recording daily activities.

Attachment 1 contains a sample of the materials sent to faculty members.

Faculty were asked to complete the time logs for the specified week, showing the time at the beginning and end of each activity and including time spent at home on activities for the school. The faculty members described in their own words their various activities and indicated, if applicable, the number and type of students present. For activities such as preparation for teaching, which were performed without students present but were directly related to a specific student category, the faculty members indicated the percent of time to be assigned to the appropriate student category. Through this process, the study group sought to minimize judgments of individual faculty members.

The next step was to group the faculty activities into the standard set of thirteen categories shown in Table 3.

Examples of activities in each of these categories are displayed in Table 4. Faculty members were asked to attend departmental meetings where study staff explained the standard categories and assisted the faculty in deciding which category most closely represented each of their reported activities. Part-time and volunteer faculty who were not able to attend the scheduled departmental meetings were given the list of categories and examples of activities for each

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*Per student costs were roughly 15% higher in one medical school, proportionately lower in another, and roughly the same at a third school. The third school was not in the sample of 14, but was one of the schools in the IOM's pilot study and had conducted faculty surveys for each quarter.

TABLE 3

Standard Activity Categories: Activity Costs and Definitions

Code	Definition
TCH	Formal teaching, in classroom, laboratory, clinical or other setting. Patients may be present, but for demonstration purposes only. Topic oriented. Students always present.
T/PC	Teaching/patient care. Patient care activities with students present. Clinical, surgical, or laboratory procedures, either being conducted by faculty with students observing, or by students with faculty member supervising.
PREP	Preparation for teaching activities in current term, including preparation for clinical activities.
CURR	General curriculum development and evaluation; teaching support activities; preparation for courses to be taught in future terms.
RES/I	Independent research including research administration. No students present.
RES/T	Research and teaching. Students present.
WRITE	Professional writing other than research findings.
PC	Patient care in any setting. No students present.
ADMIN	General administration and other internal service to the institution.
H/ADM	Hospital or clinic administration.
SERV	Service to your own professional and in a professional capacity to outside organizations.
PRO/D	Activities to keep oneself abreast of developments in one's field.
ABS	Absence from professional duties due to illness, vacation, sabbatical, other leave.

TABLE 4

Examples of Faculty Activities in Each Standard Category: Medicine

Code	Examples
TCH	- Conducting lectures, labs, seminars, conferences (didactic or clinical). - Informal after-class discussions with students about course materials. - Administration of examinations. - Teaching continuing education courses. - Supervision of non-innovative student research. - Tutorials. - Thesis guidance and supervision.
T/PC	- Rounds where patient care is performed - Work conferences concerning specific patient diagnoses. - Patient or treatment consultants with students present. - Informal discussion of cases with students present. - Surgical or obstetrical procedures with students present.
PREP	- Preparation for rounds or conferences. - Preparation for lectures or seminars. - Supervision of teaching assistants. - Preparation of course materials. - Preparing reading examination papers, lists, laboratory materials, etc. - Attending courses for which one is partly responsible. - Travel related to teaching. - Discussion with colleagues about courses. - Student evaluation. - Arranging for guest speakers.
CURR	- Attending meetings of curriculum or admissions committees. - Interviewing potential students. - Writing letters of recommendation. - Developing and scheduling courses. - Library committee. - Student counselling.
RES/I	- Benchwork. - Writing up and presenting results. - Writing proposals. - Administration of research projects. - Supervision of technicians. - Reading for research. - Preparation for and attendance at research committee meeting.
RES/T	- Same as for RES/I, but with students present.
WRITE	- Writing textbooks or textbook chapters. - Writing review articles for professional journals. - Editing for professional journals. - Responding to or commenting on articles in professional journals.
PC	- Private office practice. - Consultations with patients or with colleagues concerning patients. - Reading x-rays. - Time on-call at the hospital.

TABLE 4

Examples of Faculty Activities in Each Standard Category: Medicine
(continued)

Code	Examples
ADMIN	- Attending promotion or tenure meetings. - Attending executive faculty or planning meetings. - Writing letters of recommendations for personnel (other than students). - Preparing budgets. - Supervision of non-faculty or technical personnel. - Other general office routine.
H/ADM	- Service on hospital or clinic committees. - Planning and review of hospital or clinic activities. - Scheduling and review of house staff activities.
SERV	- Lectures to professional societies. - Lectures or other services to community organizations. - Service on advisory boards or councils for government organizations. - Planning and administration related to Health Maintenance Organizations or other community health services
PRO/D	- General journal reading. - Attending continuing education courses. - Attending other courses or seminars to keep current in one's profession. - Attending professional society meetings or conventions. - Travel related to these activities.

and were asked to code their own time logs into the standard format.

In addition to the activity data, each time log contained general information, such as the faculty member's identification number, rank, and department. This information is essential for aggregating each faculty member's activities by department, rank, and type of appointment, i.e. full-time, part-time, or volunteer.

Table 5 shows the percent of faculty who responded in each of the eight professions.

Assigning Activities to Programs. Table 6 shows the five broad categories into which the standard activities can be grouped in order to assign activities to programs. Teaching, preparation, and curriculum development activities are allocated to instruction. If more than one type of student is present during a teaching activity, the time spent in that activity is allocated among the various student categories based on the number of students present during the activity. The various categories of students were not weighted differentially. Thus, if a faculty member spent one hour in a seminar with two pharmacy students and two graduate students, the respective instruction programs were charged equally for the faculty member's time.

Time spent in independent research and patient care activities is allocated to the research and patient care programs.

The most complex activities are those that jointly produce instruction and either research or patient care. For program cost allocation, a method had to be devised to allocate time on joint activities to the programs benefitting from these activities. After discussion with administrators and faculty, the methodology described below was developed and used in the study.

Joint Teaching and Patient Care Activities. The nature of clinical instruction varies considerably within the professions, and the study methodology for allocating joint teaching and patient care activities takes into account the characteristics of clinical instruction in each profession.

Medicine

The study methodology relied on marginal analysis to allocate the time in joint teaching and patient care activities to programs in medicine. Study staff conducted detailed interviews with medical school faculty in various departments to determine the incremental instruction time in joint activities. The interviews proceeded as follows:

- the faculty member was asked to point out the parts of his total joint time that could be associated exclusively with instruction; for example, an hour of ward round may include 15 minutes of pre-round discussion with students, 30 minutes

TABLE 5

Average Percent of Faculty Response by Profession and Type of Faculty

Profession	Full-time	Part-time	Volunteer
Medicine	81	60	37
Osteopathy	87	100	NA
Dentistry	90	84	73
Optometry	87	67	50
Pharmacy	95	53	47
Podiatry	79	100	45
Veterinary Medicine	84	37	NA
Nursing	95	81	38

TABLE 6

Definition of Faculty Activities in
Health Professional Schools

Activity	Definition
Instruction activities	
1. Teaching	Formal teaching, in classroom, laboratory, clinical or other setting. Patients may be present, but for demonstration purposes only. Topic oriented. Students always present.
2. Preparation for teaching	Preparation for teaching activities in current term, including preparation for clinical activities.
3. Curriculum development and evaluation	General curriculum development and evaluation; teaching support activities; preparation for courses to be taught in future terms.
Joint activities	
4. Joint teaching and patient care	Teaching/patient care. Patient care activities with students present. Clinical, surgical, or laboratory procedures, either being conducted by faculty with students observing, or by students with faculty member supervising.
5. **Joint research and teaching Administration**	Research and teaching. Students present.
Research activities	
6. Independent research	Independent research including research administration. NO students present.
Patient care activities	
7. Patient care	Patient care in any setting. Students present.
8. Hospital/clinical administration	Hospital or clinic administration.
General support activities	
9. Administration	General administration and other internal service to the institution.
10. Service	Service to your own profession and in a professional capacity to outside organizations.
11. Professional development	Activities to keep oneself abreast of developments in one's field.
12. Writing	Professional writing other than research findings.
13. Absence	Absence from professional duties due to illness, vacation, sabbatical, other leave.

of actual patient round with students, and 15 minutes of wrap-up time answering students' questions, scheduling conferences, etc. Here, the first 15 minutes and the last 15 minutes could be charged as instructional time, reducing the joint time to 30 minutes.

- the faculty member was then asked how long this residual joint activity would have taken if there had been no students present, that is, he was asked to estimate the time it would have taken him to provide the patient care without students. If, for instance, a faculty member replied that he could have provided patient care in 20 minutes, the incremental 10 minutes is charged to instruction and 20 minutes is allocated to patient care.

Table 7 summarizes the allocation of a one-hour ward round.

This analysis was conducted at various departments of the sampled medical schools, and average factors shown in Table 8 were determined for each medical school department. These factors were applied to each joint teaching and patient care activity to compute the time allocated to instruction; the remainder was allocated to patient care.

Osteopathy

The staff conducted only a limited number of interviews to determine marginal factors at schools of osteopathy; discussions with osteopathy faculty suggested that the approach used for medical schools could be applied to schools of osteopathy because clinical instruction is similar in the two professions.

Dentistry, Optometry, Podiatry, and Veterinary Medicine

Clinics owned by schools of dentistry, optometry, podiatry*, and veterinary medicine exist primarily to provide clinical experience to students; if there were no school there would be no clinic. Moreover, the role of faculty members is primarily supervisory, with students providing the actual patient care. Thus all clinical faculty time spent in joint teaching and patient care was allocated to instruction in these professions.

Nursing

Baccalaureate and associate degree nursing faculty do not usually carry patient care responsibilities in clinics or hospitals, therefore their clinic teaching activities, though carried out in

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*One school of podiatry operates a hospital in addition to teaching clinics. The study did not attempt to identify the education costs borne by teaching hospitals, and hospitals costs are not included in education costs.

TABLE 7

Allocation of Joint Activities--An Example

Activity	Total	Instruction	Patient service
Ward round			
Pre-round discussion	15 minutes	15 minutes	
Round	30 minutes	10 minutes	20 minutes
Post-round discussion	15 minutes	15 minutes	
Total	1 hour	40 minutes	20 minutes

TABLE 8

Percent Incremental Time for Teaching by Department in Sampled Medical Schools, 1972-73

Department	Percent
Anesthesiology	20
Medicine	50
Obstetrics/gynecology	60
Pathology	50
Pediatrics	45
Psychiatry	40
Radiology	40
Surgery	40

a patient care setting, are essentially instructional in nature. The study allocated to instruction all joint teaching and patient care by nursing faculty.

For hospital based diploma nursing programs, the study used existing Medicare step-down procedures to determine education costs; joint activities were not an issue.

Pharmacy

Staff field experiences indicated that joint teaching and patient care time for pharmacy school faculty is relatively small, even for the hospital based, part-time pharmacy faculty. In addition, much of this joint time is spent in student supervision. Therefore, the study allocated all joint teaching and patient care to instruction.

Table 9 summarizes the allocation rules by profession for allocating joint teaching and patient care activities.

Joint Research and Teaching Activities. Interviews with faculty suggested that the portion of joint research and teaching time spent with first degree students can be considered instructional, although medical students contribute to some faculty research projects. On the other hand, interviews suggested that most joint research and teaching involving graduate students and house officers is primarily for the advancement of new knowledge. Because the percent of faculty time in these activities was relatively small, the study group adopted the simplified rules that all time in joint research and teaching activities associated with first degree students is allocated to instruction, and all time in joint research and teaching associated with graduate students is allocated to the research program. This allocation rule was used in all eight professions for developing instruction costs.

General Support Activities. This category, which includes administration, as well as professional development and other scholarly activities that support all programs of the school, is allocated to instruction, research, and patient care proportionate to the time allocated to these programs from other activities.

In pharmacy, optometry, and veterinary medicine, service to the profession and the community was treated as a separate program. For the other professions, service was treated as a general activity supporting all programs and allocated proportionately.

Determining Total Faculty Costs. The next step was to isolate total faculty compensation. Over the years, schools have adopted various modes of faculty compensation. Nowhere does this occur with greater variety than in schools of medicine, which use funds from such diverse sources as federal and state governments, third party patient care payers, parent university, and endowments to compensate faculty for a wide range of functions. In addition, some schools,

TABLE 9

Allocation of Joint Teaching and Patient Care Activities

A Summary

Profession	Teaching/patient care
Medicine	Allocate marginal teaching % to instruction
	Balance to patient care
Osteopathy	Same as medicine
Dentistry	100% instruction
Optometry	100% instruction
Pharmacy	100% instruction
Podiatry	100% instruction
Veterinary Medicine	Clinic setting 100% instruction
	Extension setting: 30% to instruction and balance of T/PC to PC
Nursing	100% instruction

recognizing that their compensation levels might not attract the desired clinical practitioners, permit these faculty members to engage in intramural or extramural private practice to supplement earnings. Often the institution has little knowledge or control of faculty private practice earnings. The study group took into account the variety of compensation mechanisms at each sampled institution by computing faculty costs to include total faculty compensation from all identifiable sources.

Faculty activity logs itemized time on all activities, including private patient care, so that the study group could be certain that income corresponded to activities. In general, for full-time faculty, costs are total earnings, which are allocated to programs based on total activities reported on the time log. For example, if a faculty member worked a total of 50 hours during the reporting week, with 10 hours spent instructing first degree students, and his total annual earnings were $25,000, of which $15,000 were paid by the school and the remainder was from private patient care, then 20 percent of his total earnings of $25,000, i.e., $5,000, would be allocated to the instruction of first degree students.

Allocating Faculty Costs to Programs. Faculty costs are allocated to instruction of first degree students, house officers and graduate students, and to research and patient care in the same proportions as faculty time spent in the programs. The cost of activities directly related to instruction, research, or patient care (See Table 6) is allocated to the respective program; the instruction component of joint activity costs is allocated to instruction and the remainder to research or patient care; and the costs of general support activities is allocated to all programs on a proportionate basis.

2. Other Direct Costs

These costs consist of all the non-faculty expenditures at the department level. For this study, they were grouped into the following categories:

- non-faculty salaries
- employee benefits
- supplies and expenses
- equipment

If a school recorded these expenses by department, the study also allocated them at the department level; if a school was not departmentalized, these expenses were allocated for the school as a whole. Allocation procedures used for each category are described below.

Non-faculty Salaries. These include salaries and wages for clerical and technical staff that support faculty. One of two alternative approaches was used for allocating these costs to programs, depending on the availability of detailed cost data at each school.

Some schools could divide non-faculty salaries for each department into two groups, secretarial and clerical staff costs, and technical staff costs.

In these schools secretarial staff costs were allocated to programs in the same proportion as faculty costs were allocated. Schools were asked either to conduct an analysis of technical staff time by activities or to estimate the percent of their time spent on each program.

If schools were not able to supply detailed information on non-faculty salaries, the salaries were allocated to programs according to faculty costs allocated to each program.

Employee Benefits. These costs are allocated to instruction, research, and patient care proportionate to total personnel costs in these programs, i.e., faculty as well as non-faculty personnel costs.

Supplies and Expenses. Costs for supplies and expenses pertaining to specific programs, such as sponsored research, are allocated directly to these programs; the remainder is generally allocated on the basis of total personnel costs.

Equipment. Equipment purchased during the year is treated as the cost for that year on the principle that equipment replacements approximate the use charge for all the equipment at the school. Moreover, most institutions of higher education treat annual equipment purchases as expenditures, not capital items. Equipment purchases for specific purposes, such as research or patient care, are directly allocated to these programs; the remainder is allocated to all programs proportionate to faculty costs.

C. Allocating Indirect Costs to Programs

Institutions differ greatly in their accounting procedures for overhead and support services costs, depending on their overall organization and relationship with other schools. For example, at a freestanding health professional school, all support services (e.g. plant operations, libraries, and student services) are contained in the school's overall budget. On the other hand, at a health center with more than one school, some of these services are accounted for in the overall health center or university budgets. The study group determined, for each sample school:

- where the support costs were budgeted and incurred
- how much these services cost

- whether the school is charged for all or a portion of these costs

- what portion of the cost of shared support services should be charged to each health professional school in a university or health science center

- what basis should be used to allocate the school's total allocated share of overhead costs to programs

- what amount of depreciation should be charged to each school for buildings.

Because almost every health science center and university has a different way of accounting for and charging support services, the allocation procedures appropriate for each school were developed through discussions with the school administrators and financial officers. Table 10 reflects the most common allocation rules used in health science centers.

D. Allocating Non-cash Costs to Programs

In addition to the indirect cost items in Table 10, a charge for depreciation of the buildings owned by the school was computed and included in instruction costs. The study followed the guidelines set by OMB Circular A-21, and used the straight line method for computing depreciation, which assumes an average life of fifty years for a building, i.e., an annual rate of 2 percent of the cost of the building. Allocation to programs is based generally on space utilization studies, which are available at most schools; alternatively, the total direct cost of each program is used to allocate depreciation cost.

E. Allocating the Costs of Joint Activities

The methodology for allocating joint faculty activities already has been described. The costs of these joint faculty activities are allocated to programs according to the activity assignment criteria. The general support activities of faculty, such as administration, scholarly activities, clerical staff costs and other costs that support faculty activities are allocated proportionate to faculty costs in each program.

F. Aggregation of Program Costs

For schools that are divided into departments, faculty costs and other direct costs are allocated to instruction, research, and patient care for each department. These costs are summarized for the basic science and clinical disciplines as well as for the entire school. Each school's indirect costs are then allocated to programs and its total direct and indirect costs summarized. Finally, total health science center costs are summarized by aggregating program costs of all schools within the health science center. The costs allocated to first degree student instruction

TABLE 10

Allocation of Overhead Costs

Support costs	Allocation basis for each school's share of general university and health center administration	Basis for allocation to programs
General administration, e.g., Chancellor's office	Total school expenditures	Total direct expenses in each program
General institutional, e.g., Business office Purchasing Telephones	Total school expenditures	Total direct expenses in each program
Staff benefits	Total salary dollars	Direct salary dollars in each program
Library	Number of potential users in each school: - student enrollments - faculty - housestaff	Number of users in each program: - student enrollments - faculty - housestaff Amount allocated to faculty and housestaff were re-allocated to programs based on their respective salaries
Plant operations	Square feet assigned to each school	Square feet assigned to research and educational program (excluding hospital) and/or If hospital charges college for use of research space, the amount is identified and charged to research program or If none of the above data is available, allocate based on total direct expenses
Student services and student aid	Special analysis of total expenditures or Number of students enrolled	Special analysis of expenditures or Number of students enrolled
Extension and public service	Special analysis, i.e., identify each item with specific programs or Total expenditures	Special analysis, i.e., identify each item with specific programs or total expenditures
Auxiliary enterprises, e.g., Bookstore Dental store Housing*	Special analysis/number of students/total expenditures as appropriate	Special analysis/number of students/total expenditures as appropriate

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*Net cost only, i.e., total expenses less resources.

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programs are divided by the number of students to produce instruction costs per student. This aggregation procedure is illustrated in Table 11.

The computation of total health science center costs by aggregating program costs of all the schools ensures that the instruction program includes the costs of instructing students at all the schools within the health science center. For example, if the school of dentistry provides instruction to nursing students, the costs borne by the dental school will be included in the aggregated instruction costs for nursing students at that health science center.

G. A Note on Instruction Costs per Student for Pharmacy and Nursing

The final step in computing instruction costs is to divide the instruction program costs for first degree students by the number of these students to obtain costs on a per student basis. For schools of medicine, osteopathy, dentistry, optometry, podiatry, and veterinary medicine, the procedure is simply to divide instruction costs by the number of first degree students.

In pharmacy and nursing, however, the first professional degree is at the baccalaureate level and includes a number of general baccalaureate course requirements such as social sciences and languages. The costs presented in this study reflect only the professional portion of the curriculum in these two professions. They are computed as follows:

1. Pharmacy

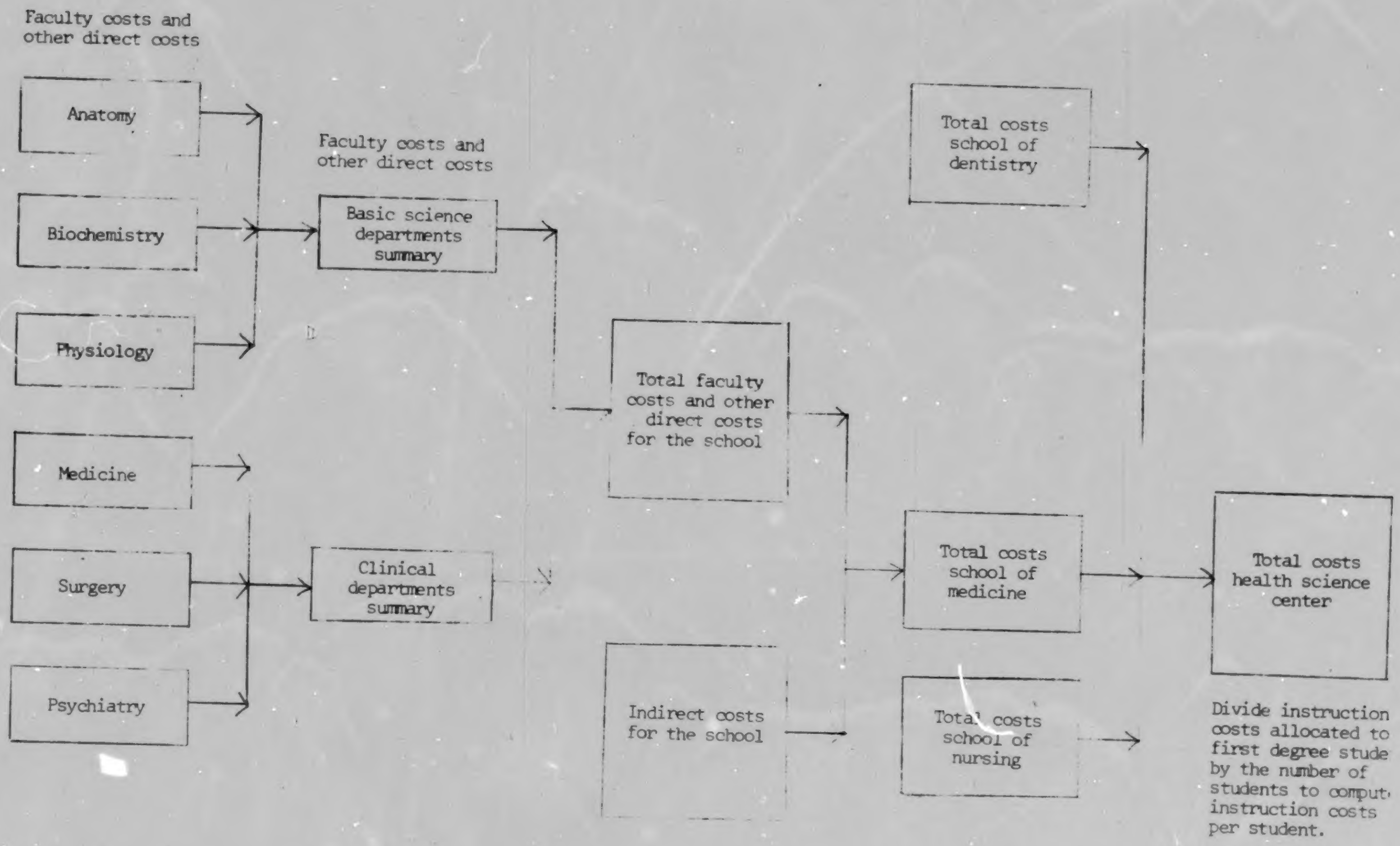
For the purposes of developing costs per student for the first professional degree in pharmacy, the liberal arts portion of the five-year program was excluded; the definition of the professional curriculum is found in Chapter 9, Part II--Pharmacy. Because a significant proportion of the professional curriculum of pharmacy students is taken outside the pharmacy schools, instruction costs at the sampled schools were adjusted upward to reflect resources not contained in pharmacy schools' budget; the procedure is also outlined in Chapter 9.

2. Nursing

For baccalaureate and associate degree nursing schools, the concept of "student equivalent" was used to determine costs on a per student basis. The use of other measures like number of students for these schools of nursing is not appropriate since they enroll nursing students at various points in the education program, which often do not coincide with the period that students begin to take nursing courses. For example, Schools A and B may have identical graduation requirements and comparable course offerings, but School A may enroll freshmen students in the nursing program although they do not take any nursing courses until their junior year while School B may enroll students only when they start taking nursing schools courses in their junior year. Moreover, neither full-time

TABLE 11

Building Program Costs


Faculty costs and other direct costs
Anatomy
Biochemistry
Physiology
Medicine
Surgery
Psychiatry
Faculty costs and other direct costs
Basic science departments summary
Clinical departments summary
Total faculty costs and other direct costs for the school
Indirect costs for the school
Total costs school of dentistry
Total costs school of medicine
Total costs school of nursing
Total costs health science center
Divide instruction costs allocated to first degree stude by the number of students to comput instruction costs per student.

equivalents, head-counts, nor full-time and part-time students data were readily available.

The student equivalent concept attempts to define the student population that consumes resources in the nursing school during a specified period. Costs per student equivalent shown in this report reflect the total cost of educational resources attributable to nursing student equivalents for each institution.

The computation is made in the following steps:

1. The number of nursing credits taken by a "typical" student at each level (or year) are determined, generally from the school's catalog.

2. Course enrollment figures are obtained from the schools and these are multiplied by the credit-hour value of each course, thus obtaining the total credit hours offered by the schools at each level, or year of study.

3. Finally, the total credit hours offered by the school is divided by the required credits for a "typical" student to produce the number of "student equivalents" for the school.

Table 12 illustrates the computational procedure used.

Computing Education Costs

At a minimum, education must include all activities directly related to student instruction, so the procedures used to compute instruction costs form the base for computing education costs. However, education of modern health professionals encompasses more than instruction; it includes a portion of research and patient service activities carried out by the institution which are essential to the education process. These activities

- provide the scientific and clinical environment to create expected professional skills and values in students

- maintain faculty skill and competence in teaching

- attract and retain competent faculty in a competitive market.

Determining how much of a school's research and patient care is essential to the education program requires subjective judgments, differing from one profession to another. The study group obtained these judgments by convening three seminars of educators and administrators from schools of medicine, dentistry, and veterinary medicine, respectively. These professions were selected because it was presumed that only in these professions did independent research and patient care activities assume large proportions. In the remaining professions, except osteopathy which is treated identically with medicine, all research and patient care costs are allocated to education. The participants in each seminar were charged with the

TABLE 12

Computation of Student Equivalents for a Baccalaureate Nursing Program

Student level	Nursing credits taken by a "typical" student a/	Student credit hours given by the nursing school b/	Student equivalents
Year 1	3	99	33.0
2	6	176	29.3
3	22	542	24.6
4	24	428	17.8
		Total student equivalents	104.7

a/Determined from the school's curriculum plan.
b/Student credit hours computed by multiplying the course enrollment times the credit-hour value of the courses taught.

task of assembling, on paper, the curricula, faculty, other personnel, depreciation, and administrative processes that would constitute an effective school of a specified size. Through this process, the judgments of experienced educators and administrators were systematically and openly arrived at and explicitly stated.

The judgments reflect a consensus among seminar participants of prevailing concepts of education in the profession--no effort was made to construct a health professional school of the future. These judgments can, however, be modified should other judgments prove more appropriate, and education costs can be computed on the basis of different judgments. Detailed methodology and findings at these seminars are presented in the next chapter.

The factors used to compute the amounts of research and patient care essential to education are summarized in Table 13. These judgments are expressed as percentages of faculty time spent in instruction activities. In computing research and patient care costs, the amount included in education costs is the actual cost incurred by the schools, by department, not to exceed the amounts specified for each profession. In general, actual research costs exceeded the specified amount of research for all sampled schools of medicine and veterinary medicine.

Actual research was higher than the specified amount at two of the eight sampled dental schools.

A. Computing Research Essential to Education

The amount of research essential to education includes faculty costs as well as an appropriate portion of the support services costs and is computed in the following steps for schools of medicine, osteopathy, dentistry, and veterinary medicine.

1. The appropriate factor from Table 14 is applied to faculty costs allocated to the instruction of first degree students in that department.

2. The ratio between faculty costs for the instruction of first degree students and faculty costs for the combined instruction of first degree students, graduate students and house officers is computed.

3. The ratio computed in step 2 is applied to faculty costs allocated to research in that department to compute the amount of research available for the education of first degree students.

4. The lesser of the amounts computed in steps 1 and 3 is the faculty cost of research essential to education for each department.

5. Faculty costs essential to the education of first degree students are aggregated for the basic science and clinical departments for each school.

TABLE 13

Faculty Research and Patient Care Activities
Considered Essential to Education

Profession	Independent research	Patient care
Medicine and Osteopathy	Basic sciences: up to 67% of faculty instruction costs. Clinical sciences: up to 30% of faculty instruction costs.	Balance of joint teaching and patient care not already included in instruction.
Dentistry	Basic sciences: up to 67% of faculty instruction costs. Clinical sciences: up to 20% of faculty instruction costs.	None--all clinical teaching costs already included in instruction.
Veterinary Medicine	Basic sciences: up to 25% of faculty instruction costs. Clinical sciences: up to 10% of faculty instruction costs.	None--all clinical teaching costs already included in instruction.
Optometry, Pharmacy, Podiatry, and Nursing	No maximum: all research expenditures included in education	Intramural faculty patient care--all clinical teaching costs already included in instruction

NOTE: The amount included in education costs in no case exceeds the actual amounts of research and patient care available in each department.

6. The ratio between other direct costs and faculty costs allocated to the instruction of first degree students is computed for the basic science and clinical departments.

7. The ratio computed in step 6 is applied to faculty costs essential to education to allocate an appropriate amount of other direct costs for research essential to education, up to a maximum of the amount of other direct costs allocated to research.

8. The ratio between indirect costs and total direct costs, i.e., faculty costs plus other direct costs, allocated to the instruction of first degree students is computed for each school.

9. The ratio computed in step 8 is applied to faculty cost plus other direct costs essential to education, computed in steps 5 and 7, to compute the appropriate amount of indirect costs for research essential to education, up to a maximum of the amount of indirect costs allocated to research.

10. At health science center schools, where more than one type of first degree student is instructed at a school, the process described above is applied for each type of first degree student.

11. The total of faculty costs (step 5) other direct costs (step 7), indirect costs (step 9), and the costs borne by other schools in the health science center (step 10) constitute the full cost of research essential to the education of first degree students.

In schools of pharmacy, podiatry, optometry, and nursing, all research is considered essential to education. The amount applicable to the education of first degree students in these professions is computed by applying to the research program costs, the ratio between instruction costs for first degree students and the combined amount for first degree students, graduate students and house officers.

To summarize, the research essential to the education of first degree students is based on judgments from seminars of educators and administrators for the professions of medicine (also applied to osteopathy), dentistry, and veterinary medicine; the full amount of research in schools of pharmacy, optometry, podiatry, and nursing is considered essential to education, and the amount of this research determined applicable to first degree students is included in education costs for these students; research costs included in education for all professions are based on actual costs allocated to research activities, and in no case exceed these actual amounts.

B. Computing Patient Care Essential to Education

The amount of patient care essential to education for schools of medicine and osteopathy consists of the total cost of joint teaching and patient care activities for first degree students, and is computed as follows:

1. The amount of faculty cost allocated to joint teaching and patient care activities for first degree students is determined for each school.

2. The portion of these joint teaching and patient care costs allocated to the instruction of first degree students is deducted from the total joint activity costs to determine the portion allocated to patient care.

3. The amount computed in step 2 represents the faculty cost of joint teaching and patient care costs essential to the education of first degree students.

4. Other direct costs, indirect costs and costs borne by other health center schools that support faculty costs computed in step 3, are calculated in the same manner as support costs for research essential to education, described in the previous section.

For schools of dentistry, pharmacy, optometry, podiatry, veterinary medicine, and nursing, all clinical instruction costs are included in instruction costs; therefore, no further adjustment is necessary in computing education costs.

Computing Net Education Expenditures

Education costs are a valid economic concept of costs but they do not take into account the revenues generated by the research and patient care essential to education. Therefore, education costs do not accurately portray the amount of education income needed by health professional schools from tuition and other sources, including federal aid. To fill this gap in information, the study group developed a method of determining the portion of education costs not funded from research and patient care sources. The result, termed net education expenditures, identifies the unfunded portion of education costs. The study group computed net education expenditures only for first degree students in the eight health professions but the methodology is generally applicable for all types of students.

Table 14 illustrates the computation of net education expenditures for first degree students using the following steps:

1. The gross income received by the school from its research and patient care activities is identified.

2. The cost of research and patient care activities is subtracted from gross income. This subtraction produces the net income or deficit for research and patient care activities respectively, to be applied to the education program.

3. The net income or deficit is allocated among the various instruction programs of the school, based on the instruction costs of each program.

4. The research costs included in education are identified, including a portion of joint research and teaching costs,

TABLE 14

Computation of Net Education Expenditures

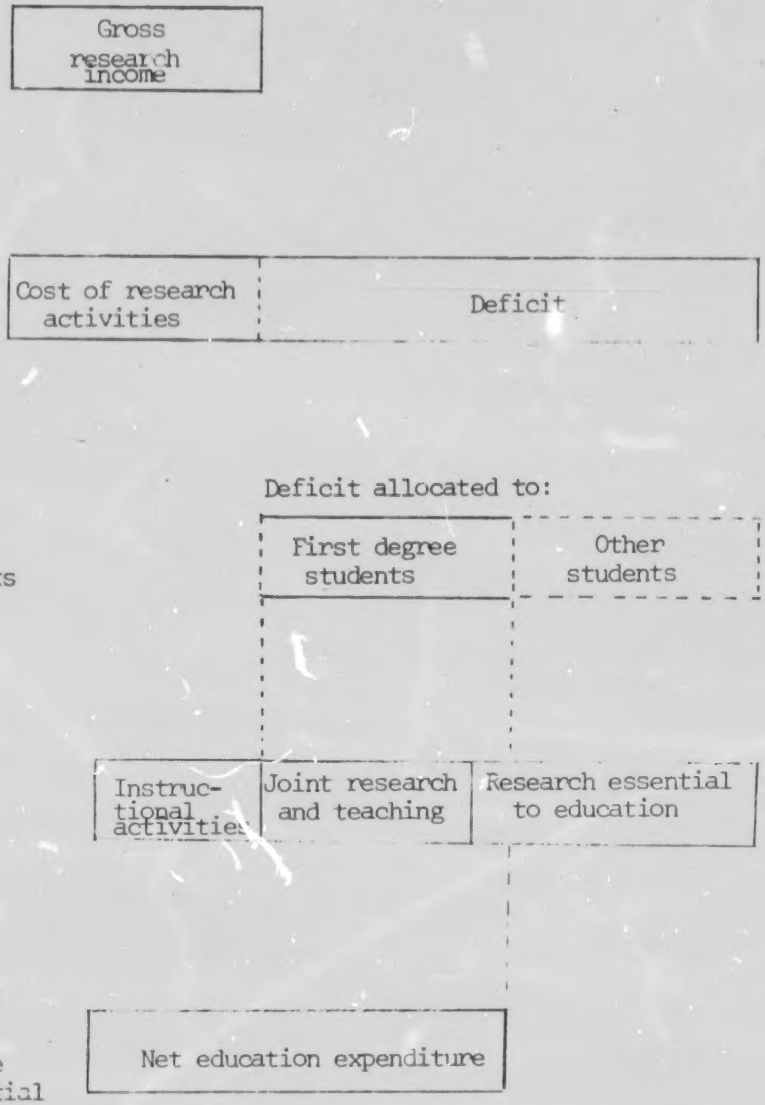
Step 1. Identify gross research income

Step 2. Calculate research surplus or deficit

Step 3. Allocate net deficit to first degree students

Step 4. Identify research costs in education

Step 5. Subtract the difference between research essential to education and the net deficit for first degree students to get net education expenditure


Gross research income
Cost of research activities
Deficit
Deficit allocated to:
First degree students
Other students
Instructional activities
Joint research and teaching
Research essential to education
Net education expenditure

and the amount of research essential to education. The same procedure is followed for patient care costs.

5. If the computation in step 3 results in a net deficit for research or patient care allocated to first degree students, which is less than the sum of research or patient care essential to education and the portion of the respective joint activities included in instruction costs, then the difference between the total research cost included in education and the net deficit is deducted from education costs to compute net education expenditures. If the allocated net deficit for research or patient care exceeds the sum of research or patient care essential to education and the portion of the respective joint activities included in instruction costs, then net education expenditures equals education costs since the revenues from research or patient care activities are not sufficient to cover even the costs of these activities not included in education. Table 15 provides hypothetical examples of this procedure.

6. If there is a net surplus for research or patient care, then the total amount of research or patient care included in education is deducted from education costs, up to a maximum of the net surplus.

   Table 16 gives hypothetical examples of this procedure; the examples show research costs, but the procedures are the same for patient care costs. School C's net surplus for first degree students exceeds the joint research and teaching costs included in instruction; therefore, the full amount of research included in the instruction is deducted from education costs. Because School D's net surplus allocated to first degree students is less than joint research and teaching cost included in instruction, the allocated net surplus is deducted from education costs.

The effect of the above procedures is to place only the *unfunded balance* of research and patient care costs in net education expenditures. When a school's total net education expenditures is divided by the number of its first degree students, the process yields net education expenditures per student.

The computations are simplified in schools with one predominant type of student or with small research and patient care programs. For these schools, net education expenditures can be computed by deducting the income generated by the school's research and patient care activities from its total institutional costs.

Sampling Methodology

In selecting the sample of schools for detailed analysis, the study sought schools that would be representative of the total population of schools in each profession. With a primary objective to develop annual average costs per student in each discipline, it was important for the study to develop cost figures from a sample representative of all schools.

TABLE 15

Computation of Net Education Expenditures When There is a Net Deficit in Research Revenues and Costs

(in thousands of dollars)

	School A	School B
Research revenues	$4,000	$8,000
Research costs	10,000	10,000
Net deficit	(6,000)	(2,000)
Net deficit allocated to first degree students - 50%	(3,000)	(1,000)
Portion of joint research and teaching allocated to instruction	500	500
Research essential to education	2,000	2,000
Total research costs included in education	2,500	2,500
Deductions from education costs for computing net education expenditures:		
- No adjustment since allocated net deficit of $3,000 is greater than total research costs in education of $2,500	-0-	
- The difference between total research costs in education of $2,500 and allocated net deficit of $1,000		1,500

TABLE 16

Computation of Net Education Expenditures When There is a Net Surplus of Research Revenues over Research Costs

(in thousands of dollars)

	School C	School D
Research revenues	$7,000	$5,250
Research costs	5,000	5,000
Net surplus	2,000	250
Net surplus allocated to first degree students - 50%	1,000	125
Portion of joint research and teaching included in instruction costs	500	500
Research essential to education	2,000	2,000
Total research costs included in education	2,500	2,500
Deductions from education costs for computing net education expenditures:		
- Full cost of research essential to education, since there is a net surplus for research	2,000	2,000
- Cost of joint research and teaching activities included in instruction costs up to a maximum of the allocated net surplus	500	125
Total deductions	$2,500	$2,125

Simple random sampling was deemed an inadequate procedure because the number of schools is small in most of the professions. And, to achieve accurate representativeness, random selection would require a larger sample than was feasible within the limited time and resource constraints of the study. Therefore, the study group stratified schools in each profession according to the major characteristics of the population, and then selected randomly from these strata. The number of schools in the resulting sample and their relationship to the total population in each discipline is displayed in Table 17. Details regarding the characteristics of the sample for the respective professions are found in Chapters 5-12, Part II.

Stratification of schools of medicine, dentistry, pharmacy, and veterinary medicine was achieved through factor and cluster analysis techniques; less complex techniques were used for schools of osteopathy, optometry, podiatry, and nursing.

A. Factor Analysis and Clustering the Schools

The following steps were used in clustering schools in the four professions:

1. Identify the significant characteristics of schools in each profession believed likely to affect education costs, e.g. size, total expenditures, total faculty.

2. Collect data from each school for the variables identified above.

3. Input this data into a factor analysis computer program that condenses the large number of variables into a small, manageable number of factors, based on the statistical relationships in the data. Factors are, therefore, synthetic variables created by condensing the large number of variables into small groups.

4. Process the results of factor analysis through the clustering program to produce groups or clusters of schools. This technique assigns each school a score based on its factor values and then groups schools into the requested number of clusters, depending on each school's score.

The variables used and the factors developed for schools of medicine, dentistry, pharmacy, and veterinary medicine are displayed in Attachment 2. The sample was selected essentially at random from these clusters, subject to the following considerations:

TABLE 17

Number of Schools Sampled in Estimating Costs of Health Professional Education, 1972-73

Profession	Total a/	Sampled schools	
		Number	Percent of total
Medicine	104	14	13
Osteopathy	7	3	43
Dentistry	50	8	16
Optometry	12	4	33
Pharmacy	73	10	14
Podiatry	5	3	60
Veterinary Medicine	18	5	28
Nursing	1,377	35	3
Baccalaureate	293	14	5
Associate	543	8	1
Diploma	541	13	2

a/Totals include the number of schools which had graduated at least one class by 1972-73.

- the selected schools represent the universe of schools in that discipline with respect to the four fundamental characteristics of size, geographic location, ownership, i.e., public and private, and organization, i.e., freestanding, university based or health center* based

- if one school at a university or health science center was selected, all other health professional schools at that institution were automatically included in the sample so that the relationships among the various schools within health science centers could be analyzed.

B. Sample Stratification Technique

For schools of osteopathy, optometry, and podiatry, the universe of schools is relatively small, with 7, 12 and 5 schools respectively in these professions. Statistical techniques are not useful for selecting a sample from such small populations. Schools in these three professions were stratified according to four major criteria--size, geographic location, ownership, i.e., public and private, and organization, i.e., freestanding, university based, or health science center based. The sample was selected to reflect the total population based on these criteria.

Because of the limited data available for the 1,377 nursing schools, the sample of nursing schools was selected using stratification techniques as follows:

- the total population was divided into schools with baccalaureate, associate degree, and diploma programs

- for each of the three programs, stratification was based on the following criteria--ownership, i.e., public and private; organization, i.e., junior college based, university based, health center based, independent or hospital based; accreditation status; graduate program status; size; and geographic location. The total number of schools was stratified into groups for each combination and the sample selected at random from these groups.

Although nursing schools are a large proportion of the sample, they represent less than three percent of nursing schools in the country. A nationwide survey of nursing schools was conducted to supplement data obtained from the sampled schools. Questionnaires, with appropriate guidelines and back-up sheets for each type of nursing program, were mailed to all nursing schools. Sample questionnaires are shown in Attachment 3. Responses from about half the schools that covers data for school years 1971-72 and 1972-73 are used in this analysis.

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*For this purpose, a health center was defined to include a school of medicine, a school of nursing, and at least one other health professional school included in this study.

Critique of the Methodology

The methodology is regarded by the study group as advancing the techniques of program cost analysis in health science centers. The study built on the foundations established by previous efforts to determine and analyze program costs at health professional schools, the most significant being the pioneering work of the Association of American Medical Colleges (AAMC). The Institute of Medicine study group believes it has made contributions in the following areas:

- the concept of net education expenditures modifies classic economic costs to portray the income requirements of schools in the real world.

- the methodology makes explicit its major assumptions and judgments through all computations; the results can be recomputed for different assumptions and judgments.

- this study represents the first consistent effort to collect and analyze the fiscal operations of educational institutions in eight health professions; the resulting information is a base for comparison and analysis.

- the methodology for measuring faculty activities and assigning them to programs--especially the marginal analysis for allocating joint activities--simplifies a complex procedure.

- constructed cost seminars proved useful in eliciting consensual judgments of the amounts of research and patient care essential to the education process.

- the survey of nursing schools constitutes the first nationwide effort to collect and analyze institutional and financial information from the 1,377 schools of nursing.

Despite these advances, the methodology has limitations. The average cost figures for each profession were developed and used to achieve the specific objectives of this study; they are not represented as being applicable to individual institutions in a particular health profession. The limitations--some of them inherent in the methodology, others reflecting the time constraints under which the study operated--include the following:

- the study relied primarily on program cost allocation concepts by which the costs of various activities are attributed to each output program on a consistent basis. It may be argued that the nature of the problem is such that it is not amenable to systematic program cost analysis. Those who take this position contend that there exists no basis for allocating "joint production" activities of these institutions; further, they hold that the problem of determining amounts of research and patient care essential to education has no analytic solution. While fully appreciating the theoretical basis for these arguments, the study group believes that reasonable assumptions and judgments can be made to overcome the problems faced. The resulting analyses and costs are not significantly affected by such assumptions and judgments, and the practical utility of these cost data surpass the theoretical arguments against the methodology.

- extreme care was taken in selecting the sample of institutions for detailed analyses to ensure that the sample represents the breadth of health professional schools. However, it is possible that the sample selected may not truly represent the universe of schools in a particular field, or that it may not be large enough to describe the full range of characteristics of each profession; the time and resource constraints of the study precluded a sample of any greater size than the one selected. Since the sample was not selected on a totally random basis, the study group did not estimate sampling error.

- there are several procedural problems regarding the faculty activity analysis conducted in the study. For example, the study's time frame dictated that the faculty activity survey be conducted during a week in spring, 1973. It may be argued that the spring survey does not provide a representative picture of total educational workload; however, data from a subsample of medical schools that were surveyed again in fall, 1973, do not indicate any significant changes between fall and spring. Next, reported faculty activities data are not easily verifiable; our analysis suggests, however, that the data were fairly consistent and reliable on a school-wide basis. Finally some medical schools in the sample could not provide reliable data on faculty private practice earnings, requiring the use of estimating procedures.

- in the difficult area of non-faculty costs and their allocation to programs, some of our allocation criteria were rudimentary. Although special studies were used wherever possible, there were several areas where the study relied on the judgment of knowledgeable personnel at the sampled schools. Procedures for allocating non-faculty costs could be refined.

- income accounting procedures at most schools were considerably less sophisticated than those for cost data. Future attempts at income analysis could certainly improve on the efforts of this study.

- several assumptions that simplified cost-finding need to be evaluated after additional research. For example, the methodology allocates faculty costs to activities in proportion to time spent; by using an average cost per hour, an hour of time carries the same value, regardless of its use for education, research, or patient care. In addition, when several types of students benefit from a specific activity, cost allocation to these student programs is proportionate to the number of students of each type. Such simplified procedures may need to be refined.

Attachment 1 to Chapter I
Materials sent to Faculty Members

Materials Sent to Faculty Members

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

INSTITUTE OF MEDICINE
STUDY OF COSTS OF
EDUCATING HEALTH PROFESSIONALS

MEMORANDUM

TO: All Full Time Faculty Members

FROM: Ruth Hanft
Director, Institute of Medicine's Cost Study

SUBJECT: Faculty Activity Reporting

Congress, in the Comprehensive Health Manpower Training Act of 1971, requested the Institute of Medicine of the National Academy of Sciences to undertake a study to determine the costs of educating students in eight health professional fields. Your institution has agreed to participate in the Institute's Study.

In order to arrive at per student costs, it will be necessary to allocate all costs to institutional programs (e.g. instruction, patient care, research, community service). Faculty salaries are a significant part of the costs. They will be distributed to the institutional programs according to time spent by the faculty in the various program activities.

Therefore, we ask you to complete the enclosed time logs, recording all your activities for the week specified in the attached notice. Included in this package is a sample time log to assist you in recording your activities.

You will also be asked to attend a Departmental meeting at which time your activities will be coded according to various activity categories. You will be notified soon by your Chairman about the time, date, and place of this meeting.

Total participation in this effort is necessary so that the wide range and variety of activities undertaken by faculty members will be accounted for in the analysis of the time log data. The Study's findings are likely to influence strongly future levels and types of federal support to health professional schools which makes it imperative that we provide the most accurate cost estimates possible.

Thank you for your cooperation.

SCHOOL OF MEDICINE OFFICE OF THE DEAN

To: All Faculty Members

From: John Smith
Dean

Subject: Institute of Medicine's Cost Study

At the request of Congress, the Institute of Medicine is conducting a study to determine the costs of educating health professionals. The study's findings will probably have a significant impact on future federal support to health professional schools. Our school has agreed to participate in the Institute's study; it is imperative that we help the Institute to develop the most accurate cost estimate possible.

Your participation is vital to the success of the study. Included in this package are several copies of 24-hour time logs on which you are requested to record your activities from 12:01 a.m. Monday, April 23, through 12:00 p.m. Sunday, April 29, 1973. Please return the completed forms to your departmental secretary by Wednesday, May 2, 1973.

You should record in the log your activities for the week indicated. Although this week may not be typical of your usual activities you are requested to record whatever your activities may be. Aggregate data will relfect a typical week within the institutions as a whole.

Departmental meetings are scheduled. At these meetings a number of the Institute of Medicine's staff will assist you to code your activities according to various activity categories to be used in the study. It is essential to the accuracy of the study that you be present at these conferences. If for some reason you are unable to attend your own department's meeting, please participate in the meeting of one of the other departments.

The Institute of Medicine has assured us that the information you provide will be kept strictly confidential. None of the individual data will leave the Institute. Only aggregate analyses (unidentified even by University) will be presented in the Institute's final report to Congress.

Thank you for your cooperation.

FACULTY ACTIVITY REPORT

(Please leave blank)

IOM I.D. #:

	Rank
	Dept.
	Appt.
	S/Dept.

1. Name: ______________________________

2. Rank: ______________________________

3. Department: ____________________

4. Type of Appointment (Check one)

   Full-time: ___

   Part-time: ___

   Volunteer: ___

5. Other department if split appointment:

   ____

(Please leave blank)

Other Data: (a) ______________

(b) ______________

(c) ______________

The following seven pages of the questionnaire are in the form of a time log to serve the dual purpose of keeping track of your activities more simply and for assembling the information more clearly.

(SAMPLE)

FACULTY TIME LOG

OMB CLEARANCE NUMBER: 68-F-73051

NAME: John W. Smith DAY: Monday ☐

Time (1)				Activity and Purpose (2)	Course Title & Number (3)	Type of Student Affected (4)												Total Hours, (leave blank) (5)	Activity Code (fill in) (6
from		to																	
hr.	min.	hr.	min			Medical Student	Dental Student	B.S. Nurse Stu	M.S. Nurse Stu	Graduate Student	House Staff Med	House Staff Den	Post M.D. Fellows	Post Ph.D. Fellows	Allied Health	Cont. Education	All other Students		
12	00	8	30	Personal															
8	30	9	00	Counselled students re: Courses		2													Curr
9	00	10	30	Conducted grand rounds		25					20	3							TCH
10	30	12	30	Teaching rounds in University Hospital		6					5								T/PC
12	30	1	00	Lunch															
1	00	2	00	Interviewed prospective medical Student		2													Curr
2	00	2	15	Wrote recommendations		95%						5%							Curr
2	15	2	30	Answered general mail															Admin
2	30	3	15	Attended departmental meeting, re: faculty utiliz.		70%					20%	10%							Curr
3	15	4	30	Supervised research - Cancer Institute grant								2							RES/T
4	30	5	00	Read professional journals															PRO/D
5	00	5	30	Travel to V. A. Hospital															PC
5	30	6	30	Private Patients. Office consultation															PC
6	30	12	00	Personal															

INSTRUCTIONS:

(1) Enter time starting and ending activity to the nearest 1/4 hour.

(2) Enter actual activities in which you were engaged, being specific about the purpose of the activity and your role in it. All time, midnight to midnight, should be accounted for; however, all personal activities (sleeping, eating, commuting to and from home should be denoted "personal."

(3) If activity is related to a specific course, enter course number and section, e.g. Micro, 335, Optometry 101.

(4) If students were present in a classroom or learning situation, record the number of students in each field of study by column, i.e., 25 nursing students, 13 medical students. Activities which are related to students but which do not necessarily involve student contact such as—wrote recommendations, prepared notes for lecture—should also be included. For each type of student affected by noncontact activities, indicate the percent of the total number of students represented by each student type. If only one type of student is affected, record the percent as 100%.

(5) Leave blank.

(6) For each activity performed, determine code (listed on Activity Code and Definition Sheet) and enter in the far right column.

BEST COPY AVAILABLE

FACULTY TIME LOG

OMB CLEAFANCE NUMBER: 68-P-73051

NAME: ______________________ DAY: ______________________ ☐

Time (1)				Activity and Purpose (2)	Course Title & Number (3)	Type of Student Affected (4)												Total Hours (leave blank) (5)	Activity Code (fill in) (6
from		to																	
hr.	min.	hr.	min			Medical Student	Dental Student	B.S. Nurse Stu	M.S. Nurse Stu	Graduate Student	House Staff Med	House Staff Den	Post M.D. Fellows	Post Ph.D. Fellows	Allied Health	Cont. Education	All other Students		

INSTRUCTIONS:

(1) Enter time starting and ending activity to the nearest 1/4 hour.

(2) Enter actual activities in which you were engaged, being specific about the purpose of the activity and your role in it. All time, midnight to midnight, should be accounted for; however, all personal activities (sleeping, eating, commuting to and from home should be denoted "personal."

(3) If activity is related to a specific course, enter course number and section, e.g. Micro. 235, Optometry 101.

(4) If students were present in a classroom or learning situation, record the number of students in each field of study by column, i.e., 25 nursing students, 13 medical students. Activities which are related to students but which do not necessarily involve student contact such as—wrote recommendations, prepared notes for lecture--should also be included. For each type of student affected by noncontact activities, indicate the percent of the total number of students represented by each student type. If only one type of student is affected, record the percent as 100%.

(5) Leave blank.

(6) For each activity performed, determine code (listed on Activity Code and Definition Sheet) and enter in the far right column.

FACULTY TIME LOG

OMB CLEARANCE NUMBER: 68-F-73051

NAME:______________________________ DAY:______________________________ ☐

Time (1)				Activity and Purpose (2)	Course Title & Number (3)	Type of Student Affected (4)												Total Hours, (leave blank) (5)	Activity Code (fill in) (6
from		to																	
hr.	min.	hr.	min			Medical Student	Dental Student	B.S. Nurse Stu	M.S. Nurse Stu	Graduate Student	House Staff Med	House Staff Den	Post M.D. Fellows	Post Ph.D Fellows	Allied Health	Cont. Education	All other Students		

INSTRUCTIONS:

(1) Enter time starting and ending activity to the nearest 1/4 hour.

(2) Enter actual activities in which you were engaged, being specific about the purpose of the activity and your role in it. All time, midnight to midnight, should be accounted for; however, all personal activities (sleeping, eating, commuting to and from home should be denoted "personal."

(3) If activity is related to a specific course, enter course number and section, e.g. Micro. 335, Optometry 101.

(4) If students were present in a classroom or learning situation, record the number of students in each field of study by column, i.e., 23 nursing students, 13 medical students. Activities which are related to students but which do not necessarily involve student contact such as—wrote recommendations, prepared notes for lecture--should also be included. For each type of student affected by noncontact activities, indicate the percent of the total number of students represented by each student type. If only one type of student is affected, record the percent as 100%.

(5) Leave blank.

(6) For each activity performed, determine code (listed on Activity Code and Definition Sheet) and enter in the far right column.

FACULTY TIME LOG

OMB CLEARANCE NUMBER: 68-P-73051

NAME: ______________________ DAY: ______________________ ☐

Time (1)				Activity and Purpose (2)	Course Title & Number (3)	Type of Student Affected (4)													Total Hours (leave blank) (5)	Activity Code (fill in) (6
from		to				Medical Student	Dental Student	B.S. Nurse Stu	M.S. Nurse Stu	Graduate Student	House Staff Med	House Staff Den	Post M.D. Fellows	Post Ph.D. Fellows	Allied Health	Cont. Education	All other Students			
hr.	min.	hr.	min																	

INSTRUCTIONS:

(1) Enter time starting and ending activity to the nearest 1/4 hour.

(2) Enter actual activities in which you were engaged, being specific about the purpose of the activity and your role in it. All time, midnight to midnight, should be accounted for; however, all personal activities (sleeping, eating, commuting to and from home should be denoted "personal."

(3) If activity is related to a specific course, enter course number and section, e.g. Micro. 335, Optometry 101.

(4) If students were present in a classroom or learning situation, record the number of students in each field of study by column, i.e., 25 nursing students, 13 medical students. Activities which are related to students but which do not necessarily involve student contact such as—wrote recommendations, prepared notes for lecture--should also be included. For each type of student affected by noncontact activities, indicate the percent of the total number of students represented by each student type. If only one type of student is affected, record the percent as 100%.

(5) Leave blank.

(6) For each activity performed, determine code (listed on Activity Code and Definition Sheet) and enter in the far right column.

Attachment 2 to Chapter 1

Descriptive Variables and Factor Analysis for Schools of Medicine, Dentistry, Pharmacy and Veterinary Medicine

Descriptive Variables and Factor Analysis for Schools of Medicine

DESCRIPTIVE VARIABLES: COLLEGES OF MEDICINE

1. Public/Private
2. Year Founded - Pre 1945: Post 1945
3. Availability of 3 year Graduation Option
4. Instructional Methodology (Departmental: Interdepartmental)
5. Number of Weeks of Instruction for Graduation
6. % Curriculum Devoted to Basic Sciences
7. Total Undergraduate Enrollment
8. Total Graduate Enrollment
9. Number of Interns and Residents
10. Number of Post-Graduates Fellows
11. % Graduates in Patient Care
12. % Graduates in Academics
13. % Graduates in Research
14. % Graduates in General Practice
15. Number of Full-Time Faculty
16. Number of Part-Time Faculty
17. Number of Volunteers
18. Number of Owned Hospitals
19. Number of Affiliated Hospitals
20. Total Enrollment
21. Full-Time Faculty/Total Students (Ratio)
22. Volunteer Faculty/Full-Time Faculty (Ratio)
23. Part Time Faculty/Full-Time Faculty (Ratio)
24. Interns & Residents/Undergraduate (Ratio)
25. Graduate Students/Undergraduates (Ratio)
26. Post-Graduate Fellows/Undergraduates (Ratio)
27. % Income from Tuition & Fees
28. % Income from Endowment
29. % Income from Services
30. % Income from Gifts

31. % Income from Medical Service Plan
32. % Income from Organized Activities
33. % Income from Sponsored Programs
34. Sponsored Programs Expenditures/Total Expenditures (Ratio)
35. Sponsored Teaching and Training Expenditures/Total Expenditures (Ratio)
36. Sponsored Research Expenditures/Total Expenditures (Ratio)
37. Contractual Services Expenditure/Total Expenditures (Ratio)
38. Regular Operating Expenditures/Total Students (Ratio)
39. Sponsored Program Expenditures/Full-Time Faculty (Ratio)
40. Medical Service Earnings/Regular Operating Expenditures (Ratio)
41. Surplus (+) or Deficit (-)/Total Regular Operating Expenditures (Ratio)
42. % Income from State Appropriation

SEVEN FACTORS: COLLEGES OF MEDICINE

Factor 1 - Career Goals and Mix of Students

Number of Clinical Fellows
Percent Graduates in Patient Care
Percent Graduates in Academics
Percent Graduates in Research
Percent Graduates in General Practice
Full-Time Faculty
Full-Time Faculty/Total Students
Post Graduates/Undergraduates
Sponsored Research/Total Expenditures

Factor 2 - Faculty Composition

Part-Time Faculty
Full-Time Faculty/Total Students
Volunteer Faculty/Full-Time Faculty
Part-Time Faculty/Full-Time Faculty
Percent Income from Medical Services
Regular Operating Expenditures/Total Student
Medical Service Funds/Regular Operating Expenditures

Factor 3 - Public/Private

Public/Private
Founded After 1945
Percent Income from Tuition and Fees
Percent Income from Gifts
Surplus/Total Regular Operating Expenditures
Percent Income from State Appropriation

Factor 4 - Sponsored Programs

(-) Percent Income from Organized Activities
Percent Income from Sponsored Programs
Sponsored Programs Expenditures/Total Expenditures
Contractual Services/Total Expenditures
Sponsored Program Expenditures/Full-Time Faculty

Factor 5 - Undergraduate Program

Year Founded (past 1945)
(-) Number of Weeks of Instruction
Undergraduate Enrollment
Graduate Enrollment
Total Students

Factor 6 - Graduate Program

Public/Private
Three Year Option
Graduate Student/Undergraduate
Post-Graduates Fellows/Undergraduate

Factor 7 - Intern and Resident Program

Number of Interns and Residents
Number of Full-Time Faculty
Number of Volunteers
Total Enrollment
Interns and Residents/Undergraduate

Descriptive Variables and Factor Analysis for Schools of Dentistry

DESCRIPTIVE VARIABLES: COLLEGES OF DENTISTRY

1. Public/Private
2. Total Enrollment
3. Preparation Level of Entrants: % Stu. 2 years
4. Preparation Level of Entrants: % Stu. 3 years
5. Preparation Level of Entrants: % Stu. 4 years
6. Total DDS Enrollment
7. % Gain in Enrollment in Last 5 Years
8. Part-Time Faculty/Full-Time Faculty (Ratio)
9. Full-Time Faculty/Students (Ratio)
10. Clinical Faculty/Clinical DDS Students (Ratio)
11. Basic Science Faculty/Basic Science DDS Students (Ratio)
12. Total Expenditures Per Student
13. Total Regular Operating Expenditures Per Student
14. Total $ Sponsored Research Grants
15. Total $ Teaching and Training Grants
16. Sponsored Program Expenditures/Total Expenditures
17. Sponsored Program Expenditures/Full-Time Faculty
18. Endowment Income and Unrestricted Gifts/Total Income
19. Basic Federal Support/Total Income
20. State Support/Total Income
21. Tuition and Fees per Student
22. Patient and Other Service Income/Total Income
23. General University Funds as % of Total Income
24. Estimated Value of Contributed Basic Science Instruction/ Total Operating Expenditures
25. % Minority Students
26. Continuing Education Students/Total Students (Ratio)
27. Advanced Education Enrollment - Clinical
28. Advanced Education Enrollment - Non-Specialty
29. Advanced Education Enrollment/DDS Enrollment
30. Established or Developing School
31. Surplus or Deficit in Operating Budget

FIVE FACTORS: COLLEGES OF DENTISTRY

Factor 1 - Public/Private Schools

Public/Private
State Support/Total Income
Basic Federal Support/Total Income
Tuition and Fees per Student
Patient and Other Service Income/Total Income
Value of Contributed Basic Sciences/Total Operating Expenditures

Factor 2 - Level of Sponsored Programs

Part-Time Faculty/Full-Time Faculty
Clinical Faculty/Clinical DDS Students
Total Expenditures Per Student
Sponsored Program Expenditures/Total Expenditures
Sponsored Program Expenditures/Full-Time Faculty
Endowment Income and Gifts/Total Income
Advanced Education Enrollment/DDS Enrollment

Factor 3 - Size of School

Total Enrollment
Total DDS Enrollment
% Gain in Enrollment in Last 5 Years
Total $ Sponsored Research Grants
Total $ Teaching and Training Grants
Advanced Education Enrollment - Clinical

Factor 4 - Level of Expenditures

Full-Time Faculty/Students
Basic Science Faculty/Basic Science Students (DDS)
Total Expenditures per Student
Total Regular Operating Expenditures per Student
Total $ Sponsored Research Grants

Factor 5 - Preparation Level of Entering Students

Preparation Level of Students: Entry of Students without prior degree
Patient and Other Service Income/Total Income
Continuing Education Students/Total Students

Descriptive Variables and Factor Analysis to Schools of Pharmacy

DESCRIPTIVE VARIABLES: COLLEGES OF PHARMACY

1. Public/Private
2. Full-Time Faculty/Total Students
3. Part-Time Faculty/Full-Time Faculty
4. Total Enrollment
5. Undergraduate Enrollment
6. Undergraduate Enrollment/Total Enrollment
7. Length of Program (3 yr; 4 yr; 5 yr)
8. Full-Time Faculty/Undergraduate Enrollment
9. Graduate Studies/Undergraduate Students
10. % Income from Tuition and Fees
11. % Income from State
12. % Income from State and Tuition & Fees
13. % Income from Basic Federal Support
14. % Income from Services
15. % Income from Gifts and Endowments
16. % Income from Sponsored Programs
17. Sponsored Research Expenditures/Total Expenditures
18. Sponsored Research Expenditures/Full-Time Faculty
19. Sponsored Teaching and Training Expenditures/Full-Time Faculty
20. Indirect and Support Costs/Total Expenditures
21. Sponsored Teaching and Training Expenditures/Total Expenditures
22. Expenditures for Academic Salaries/Total Expenditures
23. % Basic Sciences Provided by Parent Institution
24. Operating Expenditures/Total Students
25. % Growth in Past Year
26. Number of Graduate Students

FOUR FACTORS: COLLEGES OF PHARMACY

Factor 1 - Undergraduate Education

Full-Time Faculty/Total Students
Part-Time Faculty/Full-Time Faculty
Total Enrollment
Undergraduate Enrollment
Undergraduate Enrollment/Total Students
Length of Program
Full-Time Faculty/Undergraduate Enrollment
Operating Expenses/Total Students

Factor 2 - Graduate Education and Research

Graduate Students/Undergraduate
Percent Income from Sponsored Programs
Sponsored Research Expenditures/Total Expenditures
Sponsored Research/Full-Time Faculty
Number of Graduate Students

Factor 3 - Public/Private

Public/Private
Percent Income from Tuition and Fees
Percent Income from State
Percent Income from Gifts and Endowments
Percent Expenditures for Academic Salaries
Percent Basic Sciences Provided by Parent Institution

Factor 4 - Income Sources/Sponsored Programs

Percent Income from State and Tuition and Fees
Percent Income from Basic Federal Support
Sponsored Teaching and Training Expenditures/Full-Time Faculty
Sponsored Teaching and Training Expenditures/Total Expenditures

Descriptive Variables and Factor Analysis for Schools of Veterinary Medicine

DESCRIPTIVE VARIABLES: COLLEGES OF VETERINARY MEDICINE

1. Public/Private
2. Year Founded: Pre 1945; Post 1945
3. Average Educational Entry Level (years)
4. % Entry with 2 years Preparation
5. % Entry with 3 years Preparation
6. Number of Professional Students
7. Number of Graduate Students
8. Number of Interns and Residents
9. Total Enrollment
10. Number of Teaching and Research Faculty
11. Number of Research Faculty
12. Number of Agricultural Experiment Station Faculty
13. Total Faculty
14. Total Faculty/Total Students
15. Interns and Residents/Professional Students
16. PhD and Post Doctoral Fellows/Professional Students
17. Growth in 4 years
18. Continuing Education Students/Total Students
19. Use of Faculty Salary Plan
20. Course Hours Required for Graduation
21. Course Hours Provided by Other Schools/Total Hours Required
22. % Income from Services
23. % Income from Gifts and Endowments
24. % Income from Sponsored Research
25. % Income from Other Sponsored Programs
26. Sponsored Programs Income/Total Faculty
27. Total Expenditures/Total Students
28. Regular Operating Expense/Total Students
29. % Income from State Funds and Student Fees
30. % Income from Student Fees
31. Pre-Vet. Students/Professional Student

FIVE FACTORS: COLLEGES OF VETERINARY MEDICINE

Factor 1 - Level of Expenditures

- Year Founded - after 1945
- Number of Research Faculty
- Total Faculty/Total Students
- Continuing Education Students/Total Students
- Faculty Salary Plan
- Level of Gifts and Endowments
- Total Expenditures/Total Student
- Regular Operating Expenses/Total Student
- % Income from Student Fees
- Pre-Vet Students/Professional Student

Factor 2 - Graduate Education and Research

- Number of Graduate Students
- Total Enrollment
- Number of Teaching and Research Faculty
- Total Faculty
- Ph.D. and Post Doctoral/Professional Student
- Course Hours Provided by Other Schools/Total Hours Required
- % Income from Sponsored Research
- Sponsored Programs Income/Total Faculty

Factor 3 - Other Education

- Average Educational Entry Level
- Percentage of Entering Students with 3 years of Preparation
- Number of Interns and Residents
- Interns and Residents/Professional Students
- Continuing Education Students/Total Students
- Course Hours Required for Graduation

Factor 4 - Sources of Income

Average Educational Entry Level
Percentage of Entering Students with 2 years Preparation
Number of Agricultural Experiment Station Faculty
% Income from Other Sponsored Programs
% Income from State Funds and Student Fees
% Income from Student Fees

Factor 5 - Professional Education

Number of Professional Students
Total Enrollment
Total Faculty/Total Students
Growth in 4 years
% Income from Services

Attachment 3 to Chapter 1

Sample Questionnaires Sent to all Baccalaureate
and Associate Degree Program and Diploma
Schools of Nursing

Questionnaire for Diploma Schools of Nursing

NURSING QUESTIONNAIRE

COST SURVEY OF DIPLOMA SCHOOLS OF NURSING

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THE COLORED PAGES ARE TO BE RETURNED TO THE INSTITUTE OF MEDICINE IN THE ENCLOSED ENVELOPE

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Worksheet

  Instructions & Example D25 - D26
  Worksheet D27

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

INSTITUTE OF MEDICINE
STUDY OF COSTS OF
EDUCATING HEALTH PROFESSIONALS

August 31, 1973

MEMORANDUM

TO: Schools of Nursing

FROM: Ruth S. Hanft, Director Ruth S. Hanft
Study of Costs of Educating Health Professionals

SUBJECT: Cost Survey of Diploma Schools of Nursing

Congress, in the Comprehensive Health Manpower Training Act of 1971, requested the Institute of Medicine of the National Academy of Sciences to undertake a study to determine the national average costs of educating students in eight different health fields, including nursing. Specifically, Congress requested that the study:
1. determine the average per-student cost of education in each of the fields; 2. develop a methodology to determine the costs;
3. analyze the reasons for cost variations within each field;
4. develop a uniform cost finding and reporting system; and
5. explore how the Congress can use the data to set capitation rates.
A copy of the Congressional charge is enclosed.

To meet the Congressional charge, visits and detailed analyses of activity and financial data are being conducted at 36 associate degree, baccalaureate, and diploma schools of nursing in a variety of educational environments. However, this sample comprises little more than two percent of the nursing schools in the United States.

In order to enlarge the study's data base for schools of nursing and to provide national aggregate data not presently available for nursing schools, we are asking each school to complete a questionnaire and return it to the Institute of Medicine by September 30, 1973. In order for the Institute to present its final report to Congress by the January, 1974 deadline, a draft of the Institute's report must be completed by November 20. Since adequate time must be allowed for analysis, the September 30 return date is extremely important.

The returned questionnaires will be entered into a computerized data bank for examination of per-student cost ranges and for analysis of the variations in per-student costs among nursing programs. The enclosed packet consists of the questionnaire, instructions for completing it, and back-up worksheets. Both the questionnaire and the worksheets should be returned to the Institute of Medicine.

As in all phases of the Institute's cost study, information received from individual schools will remain entirely confidential and will not be identifiable by individual schools by anyone other than specified members of the internal study staff.

Your assistance in providing the data requested will be greatly appreciated. Please do not hesitate to direct questions about this survey to Mrs. Trina Resnick at (202) 961-1834.

Your completed questionnaire may be returned to:

Institute of Medicine
(c/o Mrs. Trina Resnick, JH-330)
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, D. C. 20418

Thank you for your assistance in this project.

Enclosures

Congressional Charge

The Comprehensive Health Manpower Act of 1971 (PL 92-157) represents a major change in public policy for financing health professional education: it shifted Federal aid from general institutional support of schools to support based on enrollment--capitation grants. To establish levels of capitation, and to analyze the effects of those grants on programs, the Congress required information on the actual costs of education for each of the eight health professions covered by the Act. Consequently, the Congress, in Section 205 of the Act, requested that the Secretary of Health, Education, and Welfare contract with the National Academy of Sciences to undertake certain cost studies:

> *Sec. 205. (a) (1) The Secretary of Health, Education and Welfare...shall arrange for the conduct of a study or studies to determine the national average annual per student educational cost of schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine, and nursing in providing education programs which lead, respectively, to a degree of doctor of medicine, a degree of doctor of osteopathy, a degree of doctor of dentistry (or an equivalent degree), a degree of doctor of optometry (or an equivalent degree), a degree of bachelor of science in pharmacy (or an equivalent degree), a degree of doctor of veterinary medicine (or an equivalent degree), a certificate or degree or other appropriate evidence of completion of a course of training for physicians assistants or dental therapists, or a certificate or degree certifying completion of nurse training.*
>
> *(2) Such studies shall be completed and an interim report thereon submitted not later than March 30, 1973, and a final report not later than January 1, 1974, to the Secretary, the Committee on Labor and Public Welfare to the Senate, and the Committee on Interstate and Foreign Commerce of the House of Representatives.*

(3) Such studies shall develop methodologies for ascertaining the national average annual per student educational costs and shall, on such basis, determine such costs for school years 1971-72, 1972-73 and the estimated costs for school years 1973-74 in the respective disciplines. The study shall also indicate the extent of variation among schools within the respective disciplines in their annual student education costs and the key factors affecting this variation. The studies shall employ the most recent data available from the health professional schools in the country at the time of the study.

(4) Such studies shall also describe national uniform standards for determining annual per student educational costs for each health professional school in the future years and estimates of the cost to such schools of reporting according to these uniform standards.

(5) The report shall also include recommendations concerning how the Federal Government can utilize educational cost per student data to determine the amount of capitation grants under the Public Health Service Act to each health professional school.
(b) (1) The Secretary shall request the National Academy of Sciences to conduct such studies....

American Nurses' Association, Inc.
2420 Pershing Road, Kansas City, Missouri 64108
(816) 474-5720

Rosamond C. Gabrielson, M.A., R.N.
President

Eileen M. Jacobi, Ed.D., R.N.
Executive Director

Washington Office:
1030 15th Street, N.W.
Washington, D.C. 20005
(202) 296-8010

TO: Directors/Deans
of Schools of Nursing

FROM: Eileen M. Jacobi
Executive Director

DATE: August 15, 1973

RE: Institute of Medicine - Cost Survey

The American Nurses' Association continues its efforts toward federal legislation to provide adequate funding to schools of nursing and student financial assistance. An historic problem has been the lack of hard data regarding costs of nursing education.

ANA staff and representatives have been working, along with other nurses, with the Institute of Medicine Cost-Study Staff and Steering Committee in relation to the "Study of Costs of Education Health Professionals."

Your careful, complete and prompt completion of the enclosed survey questionnaire can influence the availability of federal funding for nursing education. Please recognize that a response from each school is of utmost importance.

EMJ:MAD:jam

Enclosure

national
league
for
nursing
inc.

ten
columbus
circle
new york
n.y. 10019
212/
582-1022

August 27, 1973

Mrs. Ruth S. Hanft
Director, Study of Costs of
  Educating Health Professionals
Institute of Medicine
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C. 20418

Dear Mrs. Hanft:

We have reviewed the questionnaire to be sent to all nursing programs as part of the Institute of Medicine's study of the cost of nursing education. A high response to these questionnaires would be an excellent contribution to the validity of the study.

In view of the fact that we have no recent cost studies of nursing programs and the vital importance of this information, we hope that our constituencies will give the study their full support.

Sincerely yours,

Margaret E. Walsh

Margaret E. Walsh
Executive Director

MEW:DM/bmr

". . . that the
nursing needs
of the people
will be met."

INSTRUCTIONS

Instructions

General Instructions

The enclosed questionnaire is divided into three parts. Part I requests descriptive information about your nursing school, Part II requests financial information pertaining to the direct operating expenditures and sponsored program income of your nursing school for Fiscal Year 1971-1972. Part III requests information on the indirect expenses allocated to your nursing school as shown on your parent hospital's 1971-72 Medicare Cost Report.

Most of Part I can be completed by you as nursing school director; Parts II and III will require the assistance of your hospital's accounting office.

Please refer to the specific instructions below for guidance in completing the questionnaire. If any items are not applicable to your school, write "N.A." in the space provided.

Specific Instructions

Part I: Descriptive Information

All questions in Part I should be answered using your hospital's Fiscal Year 1971-72 as the base of reference.

Items 1-17 are self-explanatory. Items 18-23 require the completion of the enclosed worksheet before data can be entered on the questionnaire. The worksheet must be returned with the questionnaire.

Part II: Financial Information - Direct Expenses and Sponsored Program Income of the School of Nursing - Fiscal Year 1971-72

Item 1: Enter the dates Fiscal Year 1971-72 started and ended (e.g., October 1, 1971 should appear 10-01-71; September 30, 1972 should appear 09-30-72).

Item 2: Enter the total direct operating expenditures of the nursing school for Fiscal Year 1971-72. This figure should agree with that reported on your hospital's 1971-72 Medicare Cost Report Form 1562, Schedule A, Column 3.

Item 3: Enter the total direct operating expenditures of the nursing school for salaries and wages (excluding residence personnel). Then break the salaries and wages into the following categories:

a. Teaching faculty and administrative personnel -- includes director and assistant director of the nursing school, curriculum coordinators, and other teaching faculty members.

b. Instructional support personnel -- includes secretarial and clerical personnel, registrars, recruiting and admissions personnel, librarians, and audio-visual coordinators.

c. Student support personnel -- includes guidance counsellors, student health directors, and recreation directors; excludes residence personnel.

NOTE: The total salaries and wages reported in Item 3 will not agree with the salaries and wages reported in the Nursing School Cost center on Schedule A, Col. 1, of the Medicare Cost Report, if that cost center includes nurses' residence salaries.

Item 4: Enter the total direct expenditures for contracted professional services (i.e., professional personal service expenditures not covered under salaries and wages).

Item 5: a. Enter the total direct operating expenditures for tuition and fees paid by the nursing school TO A COLLEGE OR UNIVERSITY for courses taken by students.

b. Enter the total amount of fees paid by the nursing school TO AFFILIATING CLINICAL AGENCIES at which students receive clinical experience.

c. Enter the total direct operating expenditures for SCHOLARSHIPS AND LOANS paid for by the nursing school.

d. Enter the total direct operating expenditures for STUDENT UNIFORMS.

e. Enter the total direct operating expenditures for STUDENT TEXTBOOKS.

f. Enter the total direct operating expenditures for OTHER EDUCATIONAL SUPPLIES AND EXPENSES which include: library books and supplies, audio-visuals, non-capitalized instructional equipment, office supplies, travel and transportation, ceremonies, social and recreational activities, advertising, recruitment expenses, and tuition reimbursement for instructors.

Item 6: a. Enter the expenditures for student meals provided at the parent hospital only if charged directly to the school of nursing.

b. Enter the expenditures for maintaining the student residence, only if included in the nursing school cost center on the Medicare Cost Report. Include salaries and wages of residence personnel as well as supplies charged directly to the nursing student residence.

c. Enter the direct operating expenditures for all other student support activities including student health supplies and medications, student health insurance, and student laundry.

Item 7: List any items charged directly to the nursing school that are not included in Items 3-6 and enter the amounts for these items in the spaces provided. The total of Items 3-7 should equal Item 2.

Item 8: Enter the total amount of sponsored program income received by the nursing school from governmental and non-governmental agencies that was used to support programs other than the school's diploma education program. For example, sponsored program income does not include capitation grant monies; it does include special project grant monies used to support health care delivery research, curriculum research, or community service programs.

Part III Indirect Expenses Allocated to the Nursing School on Parent Hospital's Medicare Cost Report for FY 1971-72.

Part III requests information that is readily available from your hospital's 1971-72 Medicare Report. The only item that may require computation is Item 2. It requires that you break down the total square footage assigned to the nursing school, as reported on the Medicare Report, between nursing instructional areas and residence facilities. Included in instructional areas are classrooms, offices, nursing school library, demonstration labs, and auditoriums; excluded are conference rooms in clinical settings.

If exact figures on the square footage of the residence and instructional facilities are not available, estimate the pro rata share assigned to the nursing school cost center on the Medicare Cost Report that equitably can be assigned to the residence facilities (e.g., if there are 30,000 square feet in the nursing school with 3 floors devoted to residence quarters, and 3 floors devoted to instructional areas, 15,000 square feet should be assigned to the school and 15,000 feet should be assigned to the residence). If the square footage reported for the nursing school on your cost report already excludes the square footage of the student residence, write "N.A." in the space provided for Item 2.

ZIP CODE ABBREVIATIONS

ALABAMA	AL
ALASKA	AK
ARIZONA	AZ
ARKANSAS	AR
CALIFORNIA	CA
COLORADO	CO
CONNECTICUT	CT
DELAWARE	DE
DISTRICT OF COLUMBIA	DC
FLORIDA	FL
GEORGIA	GA
HAWAII	HI
IDAHO	ID
ILLINOIS	IL
INDIANA	IN
IOWA	IA
KANSAS	KS
KENTUCKY	KY
LOUISIANA	LA
MAINE	ME
MARYLAND	MD
MASSACHUSETTS	MA
MICHIGAN	MI
MINNESOTA	MN
MISSISSIPPI	MS
MISSOURI	MO
MONTANA	MT
NEBRASKA	NE
NEVADA	NV
NEW HAMPSHIRE	NH
NEW JERSEY	NJ
NEW MEXICO	NM
NEW YORK	NY
NORTH CAROLINA	NC
NORTH DAKOTA	ND
OHIO	OH
OKLAHOMA	OK
OREGON	OR
PENNSYLVANIA	PA
RHODE ISLAND	RI
SOUTH CAROLINA	SC
SOUTH DAKOTA	SD
TENNESSEE	TN
TEXAS	TX
UTAH	UT
VERMONT	VT
VIRGINIA	VA
WASHINGTON	WA
WEST VIRGINIA	WV
WISCONSIN	WI
WYOMING	WY

QUESTIONNAIRE

☐	☐	☐	☐	☐	3	☐	☐

For Office Use Only

OMB No. 68S-73126
Approval Expires 1/74

Return questionnaire to:

Institute of Medicine
(Attn: Mrs. Trina Resnick, JH-330)
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Direct telephone questions to:

Mrs. Trina Resnick
(202) 961-1834

Cost Study
Diploma Nursing School Questionnaire

Name of School of Nursing ____________________

Person to contact in regard to data:

Name ____________________

Address ____________________

____

____________________ Zip

Telephone ____________________
(Area Code) (Number)

Note: Small numbers associated with answer spaces are for data-processing use only.

Part I: Descriptive Information

1. Location of School:

Enter state in which school is located using the two-letter abbreviation used by the Post Office. ☐ 10 ☐ 11

2. Principal Source of Financial Support for Parent Hospital:

Enter "1" for public; enter "2" for private. ☐ 12

3. Accreditation:

Enter "A" if school was accredited by N.L.N. as of January 1, 1971; enter "N" if school was not accredited by N.L.N. as of January 1, 1971. ☐ 13

4. Beginning of Program:

Enter the year school first admitted students. ☐ 14 ☐ 15 ☐ 16 ☐ 17

(continued)

Note: "Full-time" and "part-time" student figures are determined as defined by your nursing school.

					3			

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5. Enrollment:

Enter the number of full-time students enrolled as of October 15, 1971.

18 19 20 21

Enter the number of part-time students enrolled as of October 15, 1971.

22 23 24 25

Enter the number of full-time students enrolled as of October 15, 1972.

26 27 28 29

Enter the number of part-time students enrolled as of October 15, 1972.

30 31 32 33

6. Graduations:

Enter the number of students graduated in 1971.

34 35 36 37

Enter the number of students graduated in 1972.

38 39 40 41

7. Length of Program:

Enter the total number of instructional clock hours required for completion of the diploma program. (Use the curriculum plan in effect for the 1971 entering class.)

42 43 44 45

8. Does the school utilize a college or university to teach basic science, social science and/or humanities courses?

Enter "Y" for Yes; enter "N" for No.

46

9. If answer to Item 8 is "Yes," indicate the total number of credit hours your students took at the college or university during F.Y. 1971-72.

Enter number of credit hours.

47 48 49 50 51

10. If answer to Item 8 is "Yes," enter the type of credit hours used by the college or university.

Enter S for semester hours.
Enter Q for quarter hours.
Enter T for trimester hours.

52

(continued)

					3			

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Note: Items 11-13 may require the assistance of your hospital's financial officer.

11. If answer to Item 8 is "Yes," indicate how the tuition and/or instructional fees for college courses are treated in your hospital's accounting system.

Enter D if your students pay tuition directly to the college.
Enter R if your students remit tuition money to the nursing school, with the nursing school subsequently paying the tuition out of its operating budget.
Enter L if your students remit money which is deposited for future payment in a hospital liability account.

Enter S if nursing school pays for college tuition at no cost to the students.

☐ 53

12. Indicate how student uniform expenses are treated in your hospital's accounting system:

Enter D if students purchase their uniforms directly from an outside supplier.
Enter R if students remit money for uniforms to the nursing school with the nursing school subsequently paying for the uniforms out of its operating budget.
Enter L if students remit money for uniforms which is deposited in a hospital liability account for future payment.
Enter S if nursing school furnishes uniforms at no charge to the students.

☐ 54

13. Indicate how student textbooks are treated in your hospital's accounting system:

Enter D if students purchase their textbooks directly from an outside supplier.
Enter R if students remit money for their textbooks to the nursing school with the nursing school subsequently paying for the books out of its operating budget.
Enter L if students remit money for textbooks which is deposited in a hospital liability account for future payment.
Enter S if nursing school furnishes textbooks at no charge to the students.

☐ 55

14. Does the nursing school employ any student health personnel?

Enter "Y" for Yes; enter "N" for No.

☐ 56

(continued)

					3			

For Office Use Only

15. Does the nursing school employ any library personnel?

Enter "Y" for Yes; enter "N" for No.

☐ 57

16. Does the hospital's laundry and linen service launder student and/or faculty uniforms?

Enter "Y" for Yes; enter "N" for No.

☐ 58

17. Does the hospital's laundry and linen service launder student residence linens?

Enter "Y" for Yes; enter "N" for No.

☐ 59

NOTE: PLEASE COMPLETE WORKSHEET BEFORE PROCEEDING TO QUESTIONS 18 - 23.

(continued)

					3			

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18. How many outside agencies were used for student clinical affiliations in F.Y. 1971-72? (Exclude agencies used simply for observational experiences and/or field trips.)

Enter number of affiliating agencies.

60 61

19. In how many of the affiliating agencies included in Item 18 did your own school of nursing faculty teach the students?

Enter number of affiliating agencies.

62 63

20. How many of the affiliating agencies included in Item 19 charged your school of nursing any per-student instructional fees?

Enter number of affiliating agencies.

64 65

21. How many of the affiliating agencies included in Item 19 charged your school of nursing for any incidental instructional expenses incurred by them as a result of providing instructional facilities for your students? (Incidental instructional expenses include items such as office rental and telephone charges.)

Enter number of affiliating agencies.

66 67

22. In how many of the affiliating agencies included in Item 18 did agency personnel have the primary responsibility for teaching and supervising your students?

Enter number of affiliating agencies.

68 69

23. How many of the affiliating agencies included in Item 22 charged your school of nursing any per-student instructional fees?

Enter Number of affiliating agencies.

70 71

24. How many of the affiliating agencies included in Item 22 charged your nursing school for any incidental instructional expenses incurred by them as a result of providing instructional facilities for your students? (Incidental instructional expenses include items such as office rental and telephone charges.)

Enter number of affiliating agencies.

72 73

(continued)

					3			

For Office Use Only

Part II. Financial Information - Direct Expenses and Sponsored Program Income of the School of Nursing, Fiscal Year 1971-72

1. Enter the date Fiscal Year 1971-72 started.	mo. 10 11 day 12 13 year 14 15
Enter the date Fiscal Year 1971-72 ended.	mo. 16 17 day 18 19 year 20 21
2. Enter the total direct operating expenditures of the nursing school.	$ 22 23 24 25 26 27
3. Enter the direct operating expenditures for salaries and wages (total):	$ 28 29 30 31 32 33
a. Enter teaching faculty and administrative personnel.	$ 34 35 36 37 38 39
b. Enter instructional support personnel.	$ 40 41 42 43 44 45
c. Enter student support personnel.	$ 46 47 48 49 50 51
4. Enter the direct operating expenditures for Contracted Professional Services.	$ 52 53 54 55 56 57

					3			

For Office Use Only

5. Educational Supplies and Expenses:	
a. Enter the direct operating expenditures for tuition and fees paid to a college or university.	$ 10 11 12 13 14 15
b. Enter the direct operating expenditures for fees paid to clinical affiliations.	$ 16 17 18 19 20 21
c. Enter the direct operating expenditures for student scholarships and loans.	$ 22 23 24 25 26 27
d. Enter the direct operating expenditures for student uniforms.	$ 28 29 30 31 32 33
e. Enter the direct operating expenditures for student textbooks.	$ 34 35 36 37 38 39
f. Enter the direct operating expenditures for other educational supplies and expenses.	$ 40 41 42 43 44 45

(continued)

					3		

For Office Use Only

6. Student Support Expenses:

a. Enter the expenditures for student meals.

$☐☐☐☐☐☐
46 47 48 49 50 51

b. Enter the expenditures for the student residence.

$☐☐☐☐☐☐
52 53 54 55 56 57

c. Enter the expenditures for other student support activities.

$☐☐☐☐☐☐
58 59 60 61 62 63

7. Enter all other expenses charged directly to the nursing school (total; then specify below).

$☐☐☐☐☐☐
64 65 66 67 68 69

a. ____________________________________

b. ____________________________________

c. ____________________________________

d. ____________________________________

e. ____________________________________

8. Enter the sponsored program income received by the nursing school during Fiscal Year 1971-72.

$☐☐☐☐☐☐
70 71 72 73 74 75

(continued)

3

For Office Use Only

Part III. Indirect Expenses Allocated to Nursing School on Fiscal Year 1971-72 Medicare Cost Report

1. On your Medicare Report, does the nursing school cost center include both nursing school and nursing student residence costs?

   Enter "Y" for Yes; enter "N" for No. ☐ 10

2. If answer to Item 1 is "Yes," estimate the number of square feet assignable to the nursing school and the number of square feet assignable to the student residence.

   Enter number of square feet in school. 11 12 13 14 15 16 sq.ft.

   Enter number of square feet in residence. 17 18 19 20 21 22 sq.ft.

3. Enter the total gross operating expenditures of the nursing school (from Column 3, Medicare Cost Report form "Reclassification and Adjustment of Trial Balance of Expenses"). $ 23 24 25 26 27 28

4. Enter the net expenditures of the nursing school (from Column 1, Worksheet B, Medicare Cost Report). $ 29 30 31 32 33 34

5. Enter the amount allocated to the nursing school for depreciation (from Columns 1(a) and 1(b), Worksheet B, Medicare Cost Report). $ 35 36 37 38 39 40

3

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6. Using the figures reported on Schedule B of your Medicare Cost Report, enter the amount allocated to the nursing school from each of the following cost centers:

   a. Administration and General $ 10 11 12 13 14 15

   b. Employee and Health Welfare $ 16 17 18 19 20 21

   c. Operation of Plant $ 22 23 24 25 26 27

   d. Maintenance of Plant $ 28 29 30 31 32 33

   e. Laundry and Linen Service $ 34 35 36 37 38 39

   f. Housekeeping $ 40 41 42 43 44 45

(continued)

					3			

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6. (continued)

g.	Dietary	$ 46 47 48 49 50 51
h.	Cafeteria	$ 52 53 54 55 56 57
i.	Maintenance of Personnel	$ 58 59 60 61 62 63
j.	Medical Supplies and Expenses	$ 64 65 66 67 68 69
k.	Pharmacy	$ 70 71 72 73 74
l.	Other (Please describe):	$ 75 76 77 78 79 80

____

____

____

(Worksheet Section follows)

WORKSHEET

TO BE RETURNED
WITH COMPLETED QUESTIONNAIRE

WORKSHEET

Please complete the following table for all clinical agencies used for your students' clinical affiliations during F.Y. 1971-72. Exclude agencies used for observational experiences or field trips.

Instructions follow and a sample worksheet is attached.

Instructions

(a) List name of agency used for clinical affiliation.

(b) Check (✓) Column 1 if your school of nursing faculty taught your students at the affiliate agency; check Column 2 if affiliating agency personnel were responsible for teaching your students.

(c) In the first column, indicate to the nearest dollar the fees paid for one student by the nursing school to the affiliate agency. Exclude incidental fees (e.g., telephone, rental) as described in Questionnaire Part I, Item 24.

In the second column, enter the purpose of the fee. Check Tuition if fee is for student tuition; check Room if fee is for student residential rooms; and check Meals if fee is for student meals provided by the affiliate. If one single fee covers more than one type of function (e.g., fee covers both tuition and lunch for students), indicate both functions on the same line. If several fees are paid for different functions (e.g., if one fee is assessed for tuition and another for student meals), record each fee and corresponding purpose on separate lines.

(d) For each affiliating agency in which agency personnel taught your students (other than occasional, informal instruction by the staff) and charged no tuition fees, enter the total number of clock hours accumulated by all of your students at the agency during Fiscal Year 1971-72. Compute as follows:

> Number of students who affiliated at the agency during Fiscal Year 1971-72 x the number of clock hours accumulated by each student at the agency = total number of student clock hours accumulated at the agency during Fiscal Year 1971-72.

Note: Position numbers under the column titles are for data processing purposes only.

SAMPLE

For Office Use Only

Example Worksheet
Utilization of Outside Agencies for Student Clinical Affiliations

FISCAL YEAR 1971-72

pos 10-11	(a) Name of Agency	(b) Students Taught by:		(c) Fee(s) Paid to Affiliate Agency by Nursing School				(d) Total Student Clock Hours Accumulated at Agency						
		pos 12	pos 13	pos 14-17	pos 18-20			pos 21-24		25-27		28-29		pos 30-34
		School Faculty	Agency Personnel	Amount of Fee (nearest $)	Purpose of Fee			# of Students per Yr.	x	# of Hrs. per Wk.	x	# of Wks.	=	Total
					Tuition	Meals	Room							
1.	Central Mental Health Center		✓	$1250 $ $	✓				x		x		=	
2.	Northern Children's Hospital	✓		$ $ $					x		x		=	
3.	City Osteopathic Hospital		✓	$390 $500 $	✓	 ✓	 ✓		x		x		=	
4.	International Medical Center		✓	$ $ $				125	x	6	x	30	=	22500
5.				$ $ $					x		x		=	
6				$ $ $					x		x		=	
7.				$ $ $					x		x		=	
8.				$ $ $					x		x		=	
9.				$ $ $					x		x		=	
10.				$ $ $					x		x		=	
11.				$ $ $					x		x		=	
12.				$ $ $					x		x		=	
13.				$ $ $					x		x		=	
14.				$ $ $					x		x		=	
15.				$ $ $					x		x		=	

SAMPLE

OMB No. 68S-73126
Approval Expires 1/74

Note: Position numbers under the column titles are for data processing purposes only.

For Office Use Only

Worksheet
Utilization of Outside Agencies for Student Clinical Affiliations

FISCAL YEAR 1971-72

pos 10-11	(a) Name of Agency	(b) Students Taught by:		(c) Fee(s) Paid to Affiliate Agency by Nursing School				(d) Total Student Clock Hours Accumulated at Agency						
		pos 12	pos 13	pos 14-17	pos 18-20			pos 21-24		25-27		28-29		pos 30-34
		School Faculty	Agency Personnel	Amount of Fee (nearest $)	Purpose of Fee: Tuition	Meals	Room	# of Students per Yr.	x	# of Hrs. per Wk.	x	# of Wks.	=	Total
1.				$ $ $					x		x		=	
2.				$ $ $					x		x		=	
3.				$ $ $					x		x		=	
4.				$ $ $					x		x		=	
5.				$ $ $					x		x		=	
6.				$ $ $					x		x		=	
7.				$ $ $					x		x		=	
8.				$ $ $					x		x		=	
9.				$ $ $					x		x		=	
10.				$ $ $					x		x		=	
11.				$ $ $					x		x		=	
12.				$ $ $					x		x		=	
13.				$ $ $					x		x		=	
14.				$ $ $					x		x		=	
15.				$ $ $					x		x		=	

Questionnaire for Baccalaureate and Associate Degree Nursing Schools

NURSING QUESTIONNAIRE

COST SURVEY OF ASSOCIATE AND BACCALAUREATE DEGREE SCHOOLS OF NURSING

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Instructions (Zip Code list at end)	A8 - A16

THE COLORED PAGES ARE TO BE RETURNED TO THE INSTITUTE OF MEDICINE IN THE ENVELOPE ENCLOSED.

Questionnaire	A17 - A24

Worksheets

Instructions & Example	A26
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NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

INSTITUTE OF MEDICINE
STUDY OF COSTS OF
EDUCATING HEALTH PROFESSIONALS

August 31, 1973

MEMORANDUM

TO: Schools of Nursing

FROM: Ruth S. Hanft, Director Ruth S. Hanft
Study of Costs of Educating Health Professionals

SUBJECT: Cost Survey of Associate and Baccalaureate Degree Schools of Nursing

Congress, in the Comprehensive Health Manpower Training Act of 1971, requested the Institute of Medicine of the National Academy of Sciences to undertake a study to determine the national average costs of educating students in eight different health fields, including nursing. Specifically, Congress requested that the study: 1. determine the average per-student cost of education in each of the fields; 2. develop a methodology to determine the costs; 3. analyze the reasons for cost variations within each field; 4. develop a uniform cost finding and reporting system; and 5. explore how the Congress can use the data to set capitation rates. A copy of the Congressional charge is enclosed.

To meet the Congressional charge, visits and detailed analyses of activity and financial data are being conducted at 36 associate degree, baccalaureate, and diploma schools of nursing in a variety of educational environments. However, this sample comprises little more than two percent of the nursing schools in the United States.

In order to enlarge the study's data base for schools of nursing and to provide national aggregate data not presently available for nursing schools, we are asking each school to complete a questionnaire and return it to the Institute of Medicine by September 30, 1973. In order for the Institute to present its final report to Congress by the January, 1974 deadline, a draft of the Institute's report must be completed by November 20. Since adequate time must be allowed for analysis, the September 30 return date is extremely important.

The returned questionnaires will be entered into a computerized data bank for examination of per-student cost ranges and for analysis of the variations in per-student costs among nursing programs. The enclosed packet consists of the questionnaire, instructions for completing it, and back-up worksheets. Both the questionnaire and the worksheets should be returned to the Institute of Medicine.

As in all phases of the Institute's cost study, information received from individual schools will remain entirely confidential and will not be identifiable by individual schools by anyone other than specified members of the internal study staff.

Your assistance in providing the data requested will be greatly appreciated. Please do not hesitate to direct questions about this survey to Mrs. Trina Resnick at (202)961-1834.

Your completed questionnaire may be returned to:

Institute of Medicine
(c/o Mrs. Trina Resnick, JH-330)
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, D. C. 20418

Thank you for your assistance in this project.

Enclosures

Congressional Charge

The Comprehensive Health Manpower Act of 1971 (PL 92-157) represents a major change in public policy for financing health professional education: it shifted Federal aid from general institutional support of schools to support based on enrollment--capitation grants. To establish levels of capitation, and to analyze the effects of those grants on programs, the Congress required information on the actual costs of education for each of the eight health professions covered by the Act. Consequently, the Congress, in Section 205 of the Act, requested that the Secretary of Health, Education, and Welfare contract with the National Academy of Sciences to undertake certain cost studies:

> *Sec. 205. (a) (1) The Secretary of Health, Education and Welfare...shall arrange for the conduct of a study or studies to determine the national average annual per student educational cost of schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine, and nursing in providing education programs which lead, respectively, to a degree of doctor of medicine, a degree of doctor of osteopathy, a degree of doctor of dentistry (or an equivalent degree), a degree of doctor of optometry (or an equivalent degree), a degree of bachelor of science in pharmacy (or an equivalent degree), a degree of doctor of veterinary medicine (or an equivalent degree), a certificate or degree or other appropriate evidence of completion of a course of training for physicians assistants or dental therapists, or a certificate or degree certifying completion of nurse training.*
>
> *(2) Such studies shall be completed and an interim report thereon submitted not later than March 30, 1973, and a final report not later than January 1, 1974, to the Secretary, the Committee on Labor and Public Welfare to the Senate, and the Committee on Interstate and Foreign Commerce of the House of Representatives.*

(3) Such studies shall develop methodologies for ascertaining the national average annual per student educational costs and shall, on such basis, determine such costs for school years 1971-72, 1972-73 and the estimated costs for school years 1973-74 in the respective disciplines. The study shall also indicate the extent of variation among schools within the respective disciplines in their annual student education costs and the key factors affecting this variation. The studies shall employ the most recent data available from the health professional schools in the country at the time of the study.

(4) Such studies shall also describe national uniform standards for determining annual per student educational costs for each health professional school in the future years and estimates of the cost to such schools of reporting according to these uniform standards.

(5) The report shall also include recommendations concerning how the Federal Government can utilize educational cost per student data to determine the amount of capitation grants under the Public Health Service Act to each health professional school.
(b) (1) The Secretary shall request the National Academy of Sciences to conduct such studies....

American Nurses' Association, Inc.

2420 Pershing Road, Kansas City, Missouri 64108
(816) 474-5720

Rosamond C. Gabrielson, M.A., R.N.
President

Eileen M. Jacobi, Ed.D., R.N.
Executive Director

Washington Office:
1030 15th Street, N.W.
Washington, D.C. 20005
(202) 296-8010

TO: Directors/Deans
of Schools of Nursing

FROM: Eileen M. Jacobi
Executive Director

DATE: August 15, 1973

RE: Institute of Medicine - Cost Survey

The American Nurses' Association continues its efforts toward federal legislation to provide adequate funding to schools of nursing and student financial assistance. An historic problem has been the lack of hard data regarding costs of nursing education.

ANA staff and representatives have been working, along with other nurses, with the Institute of Medicine Cost-Study Staff and Steering Committee in relation to the "Study of Costs of Education Health Professionals."

Your careful, complete and prompt completion of the enclosed survey questionnaire can influence the availability of federal funding for nursing education. Please recognize that a response from each school is of utmost importance.

EMJ:MAD:jam

Enclosure

national
league
for
nursing
inc.

ten
columbus
circle
new york
n.y. 10019
212/
582-1022

August 27, 1973

Mrs. Ruth S. Hanft
Director, Study of Costs of
Educating Health Professionals
Institute of Medicine
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C. 20418

Dear Mrs. Hanft:

We have reviewed the questionnaire to be sent to all nursing programs as part of the Institute of Medicine's study of the cost of nursing education. A high response to these questionnaires would be an excellent contribution to the validity of the study.

In view of the fact that we have no recent cost studies of nursing programs and the vital importance of this information, we hope that our constituencies will give the study their full support.

Sincerely yours,

Margaret E. Walsh

Margaret E. Walsh
Executive Director

MEW:DM/bmr

"... that the
nursing needs
of the people
will be met."

INSTRUCTIONS

Instructions

General Instructions

The questionnaire is divided into two parts. Part I requests descriptive information about the nursing school; Part II requests information on the direct operating expenditures and sponsored program income of the nursing school for Fiscal Years 1971-1972 and 1972-1973. In addition, there are two sets of worksheets which must be returned with the questionnaire. Worksheets A and B should be completed before answering Item 10; worksheets C and D should be completed before answering Items 14-16. It should be noted that no data on overhead costs (e.g., plant operation and maintenance costs) are required to complete the questionnaire.

Although nursing instructional units bear different names (e.g., department, division, school) the term "school" is used generically on the questionnaire to refer to all types of nursing instructional units.

Specific instructions for guidance in completing the questionnaire begin on the next page.

Specific Instructions

Part I - Descriptive Information

Items 1-5 request general information on the institutional and geographical setting of the nursing school. Items 6-16 require various types of curriculum, enrollment, and credit hour data that will be used to compute per student costs for Fiscal Years 1971-1972 and 1972-1973; Items 6-16, therefore, must be completed for both fiscal years as indicated on the questionnaire.

Item 1: Enter the state location of your school of nursing, using the two-letter abbreviation used by the post office. A list of these abbreviations is included for your convenience.

Item 2: Enter type of institution in which nursing school is located. Enter "Health Science Center" (M) only if nursing school is administratively part of an educational institution which also has a medical school and is located on the same campus as the medical school.

Item 3: Indicate whether the parent college or university is public or private.

Item 4: Enter the year(s) in which your basic baccalaureate and/or associate degree program(s) first admitted students.

Item 5: Indicate whether your basic baccalaureate and/or associate degree programs were accredited by the N.L.N. as of January, 1971.

Item 6: Enter the types of degree programs that were offered by your school of nursing and were funded out of the nursing school's budget during Fiscal Year 1971-72 and Fiscal Year 1972-73. Enter the types of programs offered during Fiscal Year 1971-72 in Column (x) and the types of programs offered during Fiscal Year 1972-73 in Column (y).

Item 7: Using available curriculum plans, enter the total credit hours for courses taught by the nursing school that a typical full-time, first-degree student at each level would have taken during Fiscal Years 1971-72 and 1972-73.

Include only nursing school course hours given to students matriculated in the nursing program; do not include credit hours taught by other departments of the college or university. Enter the nursing credit hours using curriculum plans in effect during FY 1971-72 in Column (x); enter the nursing credit hours using curriculum plans in effect during FY 1972-73 in Column (y).

Note: If your school recently has implemented curriculum changes, students at different levels may have followed different curriculum plans during fiscal years 1971-72 and 1972-73. In such cases, use the curriculum plans actually in effect for each student level during the fiscal years being studied. For example, the typical second-year student for FY 71-72 will be following the standard curriculum pattern that was implemented in FY 1970-71.

Item 8: Using available curriculum plans, enter the total credit hours given by college or university departments other than the nursing school that a typical full-time, first degree student at each level would have taken during Fiscal Years 1971-72 and 1972-73. Enter the credit hours using curriculum plans in effect during FY 1971-72 in Column (x); enter the credit hours using curriculum plans in effect during FY 1972-73 in Column (y).

Item 9: Enter the total number of credits required for graduation for the associate and/or the baccalaureate degrees. Enter the total number of credits required for the 1971 first-year entering class in Column (x); enter the total number of credits required for the 1972 first-year entering class in Column (y).

Note: If curriculum changes have been implemented, the entry for Item 9 may not agree with the totals of Items 7 and 8.

Note: Worksheets for computing the total credit hours taught by the nursing school are enclosed and should be returned with the questionnaire. An example worksheet is attached to assist you in your computations. Please complete Worksheets A and B before filling in Item 10.

Item 10: Enter the total number of credit hours taught by the nursing school during Fiscal Years 1971-72 and 1972-73 by course level.

Include courses taught during summer sessions, intersessions, and night sessions only if the costs for teaching these courses are included in the costs of the nursing school reported in Part II (e.g., if the costs of night session courses are included in the nursing school expenditures reported in Part II, include the night school credits taught in Item 10).

Item 11: Enter in Column (x) the type of credits used by your school of nursing during Fiscal Year 1971-72; enter in Column (y) the type of credit hours used by your school of nursing during FY 1972-73.

Item 12: Enter, by level, the full-time and part-time head-count enrollments in your nursing degree programs as of October 15, 1971 (enter in Column x) and October 18, 1972 (enter in Column y).

If part-time head-count enrollments are not available, enter "NA" in the space provided.

Item 13: Enter in Column (x) the number of students graduated from your degree programs during Fiscal Year 1971-72; enter in Column (y) the number of students graduated from your degree programs during Fiscal Year 1972-73.

Note: Please complete Worksheets C and D before filling in Items 14-16. Exclude agencies used simply for observational experiences and/or field trips.

Item 14: Enter the number of agencies utilized for student clinical affiliations during FY 1971-72 and FY 1972-73.

Item 15a: Of the affiliating agencies included in Item 14, enter the total number of agencies in which your own school of nursing faculty taught the students.

Item 15b: Of the agencies included in Item 15a, enter the number that charged your school of nursing any per-student instructional fees.

Item 15c: Of the agencies included in Item 15a, enter the number that charged your school of nursing for any incidental instructional expenses incurred by them as a result of providing facilities for your students' instruction (e.g., office rental, telephone).

Item 16a: Of the affiliate agencies included in Item 14, enter the total number of agencies in which agency personnel had primary responsibility for teaching and supervising your students during their affiliations.

Item 16b: Of the agencies included in Item 16a, enter the number that charged your school of nursing per-student instructional fees.

Item 16c: Of the agencies included in Item 16a, enter the number that charged your school of nursing for any incidental expenses incurred by them as a result of providing instruction for your students (e.g., office rental, telephone).

PART II - Direct Operating Expenditures and Sponsored Program Income of the Nursing School - Fiscal Years 1971-72 and 1972-73

Note: Round all sums to the nearest dollar.

Item 1: Enter dates fiscal years started and ended (e.g., July 1, 1971 should appear 07-01-71: June 30, 1972 should appear 06-30-72). Enter Fiscal Year 1971-72 under Column (x) and Fiscal Year 1972-73 under Column (y).

Item 2: Enter the total direct operating expenses for the nursing school.

If the nursing school operates both an undergraduate and a graduate program and the expenditures for the two types of programs are broken out separately on your statement of expenditures, record only the direct operating expenditures of the undergraduate program. If the expenditures for the two types of programs are not broken out, record your total direct expenditures for both programs; the cost of the undergraduate program will then be prorated on the basis of the total credit hours taught by nursing school faculty.

In both cases, include general operating expenditures from both restricted and non-restricted funds. Include expenditures from general purpose, discretionary funds such as capitation and financial distress grants.

Exclude expenditures from sponsored program funds as defined in Item 11 below. Also exclude capital expenditures, depreciation, or charges for indirect (overhead) costs assessed by the parent institution or health science center.

Item 2 should represent the total of Items 4 through 10.

Item 3: Enter the types of degree programs included in the total direct operating expenses reported in Item 2.

Item 4: Enter the total direct operating expenditures for FACULTY SALARIES AND WAGES. Include salaries of nursing school director and curriculum coordinators. Exclude fringe benefits. Enter F.Y. 1971-72 faculty salaries under Column (x) and F.Y. 1972-73 faculty salaries under Column (y).

Item 5: Enter the total direct operating expenditures for ALL OTHER SALARIES AND WAGES (e.g., salaries and wages of secretarial and clerical personnel). Enter F.Y. 1971-72 salaries under Column (x) and F.Y. 1972-73 salaries under Column (y).

Item 6: Enter the total direct operating expenditures for STIPENDS paid to graduate research and teaching assistants. Enter F.Y. 1971-72 stipends under column (x) and F.Y. 1972-73 stipends under column (y). If this item does not apply to your school, record "N.A." in the spaces provided.

Item 7: Enter the total direct operating expenditures for FRINGE BENEFITS only if allocated directly to or paid by the nursing school. Enter F.Y. 1971-72 fringe benefits in column (x) and F.Y. 1972-73 fringe benefits in column (y). If this item does not apply to your school, record "N.A." in the spaces provided.

Item 8: Enter the total direct operating expenditures for INSTRUCTION purchased by the nursing school from other departments of the university or health science center. Enter F.Y. 1971-72 expenditures in column (x) and F.Y. 1972-73 expenditures in column (y). If this item does not apply to your school, record "N.A." in the spaces provided.

Item 9: Enter the total direct operating expenditures for FEES PAID TO CLINICAL AFFILIATING AGENCIES. Enter F.Y. 1971-72 expenditures in column (x) and F.Y. 1972-73 expenditures in column (y). If the item does not apply to your school, record "N.A." in the spaces provided.

Item 10: Enter the total direct operating expenditures (both restricted and non-restricted) for OTHER SUPPLIES AND EXPENSES. This category includes items such as office supplies, membership dues, non-capitalized equipment, travel, books, periodicals, and purchased repairs. Enter F.Y. 1971-72 expenditures in column (x) and F.Y. 1972-73 expenditures in column (y).

Item 11: Enter the TOTAL AMOUNT OF SPONSORED PROGRAM INCOME received by the nursing school from agencies outside the parent university or college that was used to support programs other than the school's degree programs. For example, sponsored program income does not include capitation grant monies; it does include special project grant monies used to support health care delivery research, curriculum research, or community service programs. Enter sponsored program income received in F.Y. 1971-72 in column (x) and sponsored program income received in F.Y. 1972-73 in column (y).

ZIP CODE ABBREVIATIONS

ALABAMA	AL
ALASKA	AK
ARIZONA	AZ
ARKANSAS	AR
CALIFORNIA	CA
COLORADO	CO
CONNECTICUT	CT
DELAWARE	DE
DISTRICT OF COLUMBIA	DC
FLORIDA	FL
GEORGIA	GA
HAWAII	HI
IDAHO	ID
ILLINOIS	IL
INDIANA	IN
IOWA	IA
KANSAS	KS
KENTUCKY	KY
LOUISIANA	LA
MAINE	ME
MARYLAND	MD
MASSACHUSETTS	MA
MICHIGAN	MI
MINNESOTA	MN
MISSISSIPPI	MS
MISSOURI	MO
MONTANA	MT
NEBRASKA	NE
NEVADA	NV
NEW HAMPSHIRE	NH
NEW JERSEY	NJ
NEW MEXICO	NM
NEW YORK	NY
NORTH CAROLINA	NC
NORTH DAKOTA	ND
OHIO	OH
OKLAHOMA	OK
OREGON	OR
PENNSYLVANIA	PA
RHODE ISLAND	RI
SOUTH CAROLINA	SC
SOUTH DAKOTA	SD
TENNESSEE	TN
TEXAS	TX
UTAH	UT
VERMONT	VT
VIRGINIA	VA
WASHINGTON	WA
WEST VIRGINIA	WV
WISCONSIN	WI
WYOMING	WY

QUESTIONNAIRE

☐☐☐☐☐☐☐☐☐
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OMB No. 68S-73126
Approval Expires 1/74

Return questionnaire to:
Institute of Medicine
(Attn: Mrs. Trina Resnick, JH-330)
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Direct telephone questions to:
Mrs. Trina Resnick
(202) 961-1834

Cost Study
Nursing School Questionnaire

Name of School of Nursing ____________________

Person to contact in regard to data:

Name ____________________

Address ____________________

____

____________________ Zip

Telephone ____________________
(area code) (number)

Note: Please disregard small numbers associated with the answer spaces. The numbers are for data processing use only.

Part I: Descriptive Information

1. Location of School of Nursing:
   Enter state abbreviation ☐ 10 ☐ 11

2. Type of parent institution: ☐ 12
   Enter J for Junior college or technical institute
   Enter C for senior College or university
   Enter M for health science center
   Enter T for other

3. Principal Source of Financial Support: ☐ 13
   Enter 1 for public; enter 2 for private

4. Year students were first admitted to first degree programs:
   Enter year for associate degree program ☐ 14 ☐ 15 ☐ 16 ☐ 17
   Enter year for baccalaureate degree program ☐ 18 ☐ 19 ☐ 20 ☐ 21

5. Accreditation:
   Enter "Y" if baccalaureate program was accredited by N.L.N. as of January 1, 1971; enter "N" if it was not. ☐ 22

   Enter "Y" if associate degree program was accredited by N.L.N. as of January 1, 1971; enter "N" if it was not. ☐ 23

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6. Types of degree programs offered by school of nursing:

	(x) F.Y. 1971-72	(y) F.Y. 1972-73
Enter A for associate degree	☐ 24	☐ 24
Enter B for baccalaureate degree	☐ 25	☐ 25
Enter M for master's degree	☐ 26	☐ 26
Enter D for doctoral degree	☐ 27	☐ 27

7. Nursing school credits taken by a typical first-degree student:

Enter number of credits taken during first year	☐☐ 28 29	☐☐ 28 29
Enter number of credits taken during second year	☐☐ 30 31	☐☐ 30 31
Enter number of credits taken during third year	☐☐ 32 33	☐☐ 32 33
Enter number of credits taken during fourth year	☐☐ 34 35	☐☐ 34 35

8. Other credits taken by a typical student:

Enter number of credits taken during first year	☐☐ 36 37	☐☐ 36 37
Enter number of credits taken during second year	☐☐ 38 39	☐☐ 38 39
Enter number of credits taken during third year	☐☐ 40 41	☐☐ 40 41
Enter number of credits taken during fourth year	☐☐ 42 43	☐☐ 42 43

9. Total number of credits required for graduation:

Enter number for associate degree	☐☐☐ 44 45 46	☐☐☐ 44 45 46
Enter number for baccalaureate degree	☐☐☐ 47 48 49	☐☐☐ 47 48 49

Note: Complete Worksheets A and B before completing Item 10.

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	(x) F.Y.1971-72	(y) F.Y.1972-73
10. TOTAL number of credit hours taught by the nursing school:		
Enter number of first-year level credit hours	☐☐☐☐ 50 51 52 53	☐☐☐☐ 50 51 52 53
Enter number of second-year level credit hours	☐☐☐☐ 54 55 56 57	☐☐☐☐ 54 55 56 57
Enter number of third-year level credit hours	☐☐☐☐ 58 59 60 61	☐☐☐☐ 58 29 60 61
Enter number of fourth-year level credit hours	☐☐☐☐ 62 63 64 65	☐☐☐☐ 62 63 64 65
Enter number of graduate credit hours	☐☐☐☐ 66 67 68 69	☐☐☐☐ 66 67 68 69
Enter number of refresher/continuing education credit hours	☐☐☐☐ 70 71 72 73	☐☐☐☐ 70 71 72 73
11. Type of credit hours: Enter S for semester hours Enter Q for quarter hours Enter T for trimester hours	☐ 74	☐ 74

☐☐☐☐☐☐☐☐☐
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12. Enrollment:		
a. Enter total full-time students	☐☐☐☐ 10 11 12 13	☐☐☐☐ 10 11 12 13
Enter number of full-time first-year students	☐☐☐☐ 14 15 16 17	☐☐☐☐ 14 15 16 17
Enter number of full-time second-year students	☐☐☐☐ 18 19 20 21	☐☐☐☐ 18 19 20 21
Enter number of full-time third-year students	☐☐☐☐ 22 23 24 25	☐☐☐☐ 22 23 24 25
Enter number of full-time fourth-year students	☐☐☐☐ 26 27 28 29	☐☐☐☐ 26 27 28 29
Enter number of full-time graduate students	☐☐☐☐ 30 31 32 33	☐☐☐☐ 30 31 32 33

☐☐☐☐☐☐☐☐☐

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Note: Definition of "part-time" is as defined by your nursing school.

12. Enrollment (cont.):

	(x) F.Y.1971-72	(y) F.Y.1972-73
b. Enter total part-time students	☐☐☐☐ 34 35 36 37	☐☐☐☐ 34 35 36 37
Enter number of part-time first-year students	☐☐☐☐ 38 39 40 41	☐☐☐☐ 38 39 40 41
Enter number of part-time second-year students	☐☐☐☐ 42 43 44 45	☐☐☐☐ 42 43 44 45
Enter number of part-time third-year students	☐☐☐☐ 46 47 48 49	☐☐☐☐ 46 47 48 49
Enter number of part-time fourth-year students	☐☐☐☐ 50 51 52 53	☐☐☐☐ 50 51 52 53
Enter number of part-time graduate students	☐☐☐☐ 54 55 56 57	☐☐☐☐ 54 55 56 57

13. Graduations:

Enter number of associate degrees awarded	☐☐☐ 58 59 60	☐☐☐ 58 59 60
Enter number of baccalaureate degrees awarded	☐☐☐ 61 62 63	☐☐☐ 61 62 63
Enter number of master's and doctoral degrees awarded	☐☐☐ 64 65 66	☐☐☐ 64 65 66

Note: Complete Worksheets C and D before completing Items 14-16.

14. Number of agencies utilized for student clinical affiliations:

Enter number of affiliating agencies	☐☐ 67 68	☐☐ 67 68

15.a. Number of agencies in which nursing school faculty taught the students:

Enter number of affiliating agencies	☐☐ 69 70	☐☐ 69 70

15.b. Number of agencies that assessed per-student fees:

Enter number of affiliating agencies	☐☐ 71 72	☐☐ 71 72

☐☐☐☐☐☐☐☐☐
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	(x) F.Y.1971-72	(y) F.Y.1972-73
15.c. Number of agencies that charged for incidental instructional expenses: (rentals, etc.)		
Enter number of affiliating agencies	☐☐ 73 74	☐☐ 73 74
16.a. Number of agencies in which agency staff taught the students:		
Enter number of affiliating agencies	☐☐ 75 76	☐☐ 75 76
16.b. Number of teaching agencies that assessed per-student fees:		
Enter number of affiliating agencies	☐☐ 77 78	☐☐ 77 78
16.c. Number of teaching agencies that charged for incidental instructional expenses:		
Enter number of affiliating agencies	☐☐ 79 80	☐☐ 79 80

☐☐☐☐☐☐☐☐☐

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Part II. Direct Operating Expenditures and Sponsored Program Income of the Nursing School - Fiscal Years 1971-72 and 1972-73

1. Date fiscal years started and ended:

	(x) F.Y. 1971-72			(y) F.Y. 1972-73		
	mo.	day	yr.	mo.	day	yr.
Enter date fiscal year started	☐☐ 10 11	☐☐ 12 13	☐☐ 14 15	☐☐ 10 11	☐☐ 12 13	☐☐ 14 15
Enter date fiscal year ended	☐☐ 16 17	☐☐ 18 19	☐☐ 20 21	☐☐ 16 17	☐☐ 18 19	☐☐ 20 21

Enter the Amounts to the Nearest Dollar

2. TOTAL DIRECT OPERATING EXPENDITURES:

Enter total direct operating expenditures	$☐☐☐☐☐☐☐ 22 23 24 25 26 27 28	$☐☐☐☐☐☐☐ 22 23 24 25 26 27 28

	(x)	(y)
3. Type of degree programs included in the total direct operating expenditures of Item 2 above	☐ 29	☐ 29

Enter "A" if only an A.D. program is included

Enter "B" if only a Baccalaureate program is included

Enter "C" if both an A.D. and a Baccalaureate program are included

Enter "D" if both a Baccalaureate and a graduate program are included

Enter "E" if the A.D., Baccalaureate and graduate programs are all included

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	(x) F.Y. 1971-72	(y) F.Y. 1972-73
4. Expenditures for FACULTY SALARIES AND WAGES:		
Enter direct operating expenditures	$ 30 31 32 33 34 35	$ 30 31 32 33 34 35
5. Expenditures for OTHER SALARIES AND WAGES:		
Enter direct operating expenditures	$ 36 37 38 39 40 41	$ 36 37 38 39 40 41
6. Expenditures for STIPENDS:		
Enter direct operating expenditures	$ 42 43 44 45 46 47	$ 42 43 44 45 46 47
7. Expenditures for FRINGE BENEFITS:		
Enter direct operating expenditures	$ 48 49 50 51 52 53	$ 48 49 50 51 52 53
8. Expenditures for PURCHASED INSTRUCTION:		
Enter direct operating expenditures	$ 54 55 56 57 58 59	$ 54 55 56 57 58 59
9. Expenditures for AFFILIATING AGENCY FEES (From Worksheets C and D):		
Enter direct operating expenditures	$ 60 61 62 63 64 65	$ 60 61 62 63 64 65
10. Expenditures for OTHER SUPPLIES AND EXPENSES		
Enter direct operating expenditures	$ 66 67 68 69 70 71	$ 66 67 68 69 70 71
11. SPONSORED PROGRAM INCOME:		
Enter sponsored program income	$ 72 73 74 75 76 77	$ 72 73 74 75 76 77

WORKSHEETS

TO BE RETURNED WITH COMPLETED QUESTIONNAIRE

Worksheets A & B

Please complete the following tables for the courses taught by the nursing school during Fiscal Years 1971-72 and 1972-73, using the codes at the bottom of each page.

WORKSHEET A is to be completed for courses taught during F.Y. 1971-72.

WORKSHEET B is to be completed for courses taught during F.Y. 1972-73.

If the financial data for Part II of the questionnaire (Direct Operating Expenditures and Sponsored Program Income figures) includes the costs of evening session, summer session and/or inter-session courses, please include course information for these sessions on the following tables. If the financial data for Part II excludes the costs of these sessions, do not include the course information for these sessions on the tables. An example table with the codes to be used is outlined below:

NOTE: Small position numbers are for data processing use only

EXAMPLE

First-Year Level

Level 1 (pos.10)	(A) Course Number (pos.11-16)	(B) Type of Session* (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-75)
1	11	R, F, 71	Nursing Care in Acute Illnesses - I	97	3	291
1	12	R, W, 71	Nursing Care in Acute Illnesses - II	35	3	105
1	21	E, P, 72	Historical Developments in Nursing	85	2	170
1	22	N, W, 72	Issues in Nursing	8	1	8
					Total	574

*Use the following codes:

R = regular session
N = Intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

								A

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OMB No. 68S-73126
Approval Expires 1/74

WORKSHEET A - FY 1971-1972

Note: Small position numbers are for data processing use only.

FIRST-YEAR LEVEL

Level 1 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

								A

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WORKSHEET A - F.Y. 1971-1972 (Cont.)

Note: Small position numbers are for data processing use only.

SECOND-YEAR LEVEL

Level 2 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

								A

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WORKSHEET A - F.Y. 1971-1972 (Cont.)

Note: Small position numbers are for data processing use only.

THIRD-YEAR LEVEL

Level 3 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

								A

For Office Use Only

WORKSHEET A - F.Y. 1971-1972 (Cont.)

Note: Small position numbers are for data processing use only.

FOURTH-YEAR LEVEL

Level 4 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
					TOTAL	

*Use the following codes:

R = regular session	P = spring session	71 = 1971
N = intersession	F = fall session	72 = 1972
S = summer session	W = winter session	73 = 1973
E = evening session	T = other type of session	

								A

For Office Use Only

WORKSHEET A - F.Y. 1971-1972 (Cont.)

Note: Small position numbers are for data processing use only.

GRADUATE LEVEL

Level G (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

								B

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WORKSHEET B - F.Y. 1972-1973

Note: Small position numbers are for data processing use only.

FIRST-YEAR LEVEL

Level 1 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
1						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

									B

For Office Use Only

WORKSHEET B - F.Y. 1972-1973 (Cont.)

SECOND-YEAR LEVEL

Note: Small position numbers are for data processing use only.

Level 2 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
2						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

								B

For Office Use Only

WORKSHEET B - F.Y. 1972-1973 (Cont.)

Note: Small position numbers are for data processing use only.

THIRD-YEAR LEVEL

Level 3 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
3						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

								B

For Office Use Only

WORKSHEET B - F.Y. 1972-1973 (Cont.)

Note: Small position numbers are for data processing use only.

FOURTH-YEAR LEVEL

Level 4 (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
4						
					TOTAL	

*Use the following codes:

R = regular session
N = intersession
S = summer session
E = evening session

P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
73 = 1973

	.							B

For Office Use Only

WORKSHEET B - F.Y. 1972-1973

GRADUATE LEVEL

Note: Small position numbers are for data processing use only.

Level G (pos 10)	(A) Course Number (pos.11-16)	(B) Type of Session * (pos. 17-22)	(C) Course Title (pos. 23-65)	(D) Course Enrollment (pos. 66-69)	(E) Number of Credits per Course (pos. 70-71)	(F) Total Credit Hours (D x E = F) (pos. 72-76)
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
G						
					TOTAL	

*Use the following codes:

R = regular session
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P = spring session
F = fall session
W = winter session
T = other type of session

71 = 1971
72 = 1972
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WORKSHEETS C AND D

Please complete the following tables for all clinical agencies used for your students' clinical affiliations, whether or not fees are paid to the affiliated agencies. Exclude observational experiences and field trips. Worksheet C is to be used for clinical agencies utilized during F.Y. 1971-72 and Worksheet D is to be used for clinical agencies utilized during F.Y. 1972-73.

Instructions for completing the worksheet follow. An example worksheet is attached to aid you in completing Worksheets C and D.

Instructions

(a) List name of agency used for clinical affiliation.

(b) Check (✓) Column 1 if your school of nursing faculty teaches your students at the affiliated agency; check Column 2 if affiliated agency personnel are responsible for teaching your students.

(c) If the nursing school pays fees on a per-student basis to the affiliated agency, enter the per-student amount (to the nearest dollar). Enter the purpose of the fee: Check Tuition if fee is for student tuition; check Room if fee is for student residential rooms; and check Meals if fee is for student meals provided by the affiliate. If one single fee covers more than one type of function (e.g., fee covers both tuition and lunch for students), indicate both functions on the same line. If several fees are paid for different functions (e.g., if one fee is assessed for tuition and another for student meals). record each fee and corresponding purpose on separate lines.

(d) For each affiliated agency in which AFFILIATED AGENCY PERSONNEL TEACH YOUR STUDENTS (other than occasional, informal instruction by the staff) AND CHARGE NO TUITION FEES, enter the total number of clock hours accumulated by all of your students at the agency during the fiscal year. Compute as follows:

> Number of students who affiliated at the agency during the fiscal year X the number of clock hours accumulated by each student at the agency = total number of student clock hours accumulated at the agency during the fiscal year.

Note: Position numbers under the column titles are for data processing purposes only.

S A M P L E

For Office Use Only

Example Worksheet C
Utilization of Outside Agencies for Student Clinical Affiliations

FISCAL YEAR 1971-72

pos 10-11	(a) Name of Agency	(b) Students Taught by:		(c) Fee(s) Paid to Affiliate Agency by Nursing School				(d) Total Student Clock Hours Accumulated at Agency			
		pos 12	pos 13	pos 14-17	pos 18-20			pos 21-24	25-27	28-29	pos 30-34
		School Faculty	Agency Personnel	Amount of Fee (nearest $)	Purpose of Fee			# of Students per Yr. x	# of Hrs. per Wk.	x # of Wks. =	Total
					Tuition	Meals	Room				
1.	Central Mental Health Center		✓	$1250 $ $	✓			x	x	=	
2.	Northern Children's Hospital	✓		$ $ $				x	x	=	
3.	City Osteopathic Hospital		✓	$390 $500 $	✓	 ✓	 ✓	x	x	=	
4.	International Medical Center		✓	$ $ $				125 x	6 x	30 =	22500
5.				$ $ $				x	x	=	
6.				$ $ $				x	x	=	
7.				$ $ $				x	x	=	
8.				$ $ $				x	x	=	
9.				$ $ $				x	x	=	
10.				$ $ $				x	x	=	
11.				$ $ $				x	x	=	
12.				$ $ $				x	x	=	
13.				$ $ $				x	x	=	
14.				$ $ $				x	x	=	
15.				$ $ $				x	x	=	

SAMPLE

OMB No. 68S-73126
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Note: Position numbers under the column titles are for data processing purposes only.

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For Office Use Only

Worksheet C
Utilization of Outside Agencies for Student Clinical Affiliations

FISCAL YEAR 1971-72

pos 10-11	(a) Name of Agency	(b) Students Taught by:		(c) Fee(s) Paid to Affiliate Agency by Nursing School				(d) Total Student Clock Hours Accumulated at Agency			
		pos 12	pos 13	pos 14-17	pos 18-20			pos 21-24	25-27	28-29	pos 30-34
		School Faculty	Agency Personnel	Amount of Fee (nearest $)	Purpose of Fee			# of Students per Yr. x	# of Hrs. per Wk.	x # of Wks. =	Total
					Tuition	Meals	Room				
1.				$ $ $				x	x	=	
2.				$ $ $				x	x	=	
3.				$ $ $				x	x	=	
4.				$ $ $				x	x	=	
5.				$ $ $				x	x	=	
6.				$ $ $				x	x	=	
7.				$ $ $				x	x	=	
8.				$ $ $				x	x	=	
9.				$ $ $				x	x	=	
10.				$ $ $				x	x	=	
11.				$ $ $				x	x	=	
12.				$ $ $				x	x	=	
13.				$ $ $				x	x	=	
14.				$ $ $				x	x	=	
15.				$ $ $				x	x	=	

OMB No. 68S-73126
Approval Expires 1/74

Note: Position numbers under the column titles are for data processing purposes only.

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Worksheet D
Utilization of Outside Agencies for Student Clinical Affiliations

FISCAL YEAR 1972-73

pos 10-11	(a) Name of Agency	(b) Students Taught by:		(c) Fee(s) Paid to Affiliate Agency by Nursing School				(d) Total Student Clock Hours Accumulated at Agency			
		pos 12	pos 13	pos 14-17	pos 18-20			pos 21-24	25-27	28-29	pos 30-34
		School Faculty	Agency Personnel	Amount of Fee (nearest $)	Purpose of Fee			# of Students per Yr. x	# of Hrs. per Wk. x	# of Wks. =	Total
					Tuition	Meals	Room				
1.				$ $ $							
2.				$ $ $							
3.				$ $ $							
4.				$ $ $							
5.				$ $ $							
6.				$ $ $							
7.				$ $ $							
8.				$ $ $							
9.				$ $ $							
10.				$ $ $							
11.				$ $ $							
12.				$ $ $							
13.				$ $ $							
14.				$ $ $							
15.				$ $ $							

Chapter 2

THE CONSTRUCTED COSTS PROCESS

A major feature of the Institute of Medicine's study of the costs of education in the health professions was the use of a technique to "construct" models of hypothetical schools and to assign costs to these constructed models. These constructed costs helped the study group to understand what constitutes an education program and why the costs of that program should be distributed in particular proportions among the activities necessary to education. Constructed costs identified the resources needed by a school to educate students, without the distortions imposed on an actual school by historical funding practices.

Seminars of educators and administrators developed constructed costs models for this study in the professions of medicine, dentistry, and veterinary medicine.* The models led to definitions of the amounts of research and patient care that are essential to education, and to the study group's understanding of the relationships between education, research, and patient care that constitute the "joint activities" common to health professional schools.

Deliberations of the constructed costs seminars on alternative ways to allocate joint activities contributed to the development of the concept of "net education expenditures," which is the basis recommended by the study group for financing education costs. Also, the process of constructing costs pointed up the sensitivity of costs to variations in resource allocation, which furthered the study group's understanding of cost variations among different institutions in the same profession.

This chapter describes the study group's reasons for undertaking constructed costs modeling, summarizes the methodology, and discusses the significance of the effort for the study. The first attachment to the chapter presents a summary of the detailed steps used in

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*Constructed costs models in optometric and podiatric education have been developed by the professional associations representing those institutions. See Charles W. Gibley, John A. McColgan, William F. Ashly, and Robert A. Capone, "A Constructed Cost of Podiatric Education: Report and Summary of the Study," *Journal of Podiatric Education* 4 (December, 1973) pp. 5-20; and *Optometric Education: A Constructed Cost Study*, (unpublished), prepared by the Fore Consultants for the American Optometric Association and the Association of Schools and College of Optometry.

building the models; subsequent attachments describe the deliberations of the seminars in medicine, dentistry, and veterinary medicine.*

Why Construct Costs?

The study group recognized that, in addition to instruction, there are components of research, patient care, and graduate education programs that are essential to the education of first degree students, and that the magnitude of these components vary according to profession and institution. The study group also recognized that historical funding practices have influenced the extent to which institutions support these programs, and thus the costs and financing of each institution.

In addition, the prevalence of joint activities and multiple programs in health professional schools made it necessary that allocation rules be developed for distributing joint activity costs among the various programs. Specifically, formulas were needed to allocate these costs between first degree education and the other programs of the institution--research, patient care, and graduate education.

The circumstances suggested a need to establish a framework for analysis that would be independent of historic financing patterns of health professional schools. Constructed costs modeling was developed to meet this need. The intent of the constructed costs process was to build an institution for 400 students. The institution would have first degree education as the primary mission, and would graduate a typical mixture of primary practitioners, specialists, and academicians without a strong emphasis in any one category. It was not intended to represent an ideal institution, but simply one that would provide adequate first degree education in accordance with current standards and requirements in this country.

Methodology and Approach

The basic approach of the constructed costs effort was threefold: first, information and reference materials on the programs, staffing, and character of health professional schools were assembled by staff into Planner's Reference Books and made available to each participant following the distribution of a questionnaire on the curriculum, faculty and support resources required.* Second, three panels of educators and administrators in medicine, dentistry, and veterinary medicine developed the curriculum for first degree education, and the faculty and other resources required for an adequate education program. Finally, the study group incorporated the major contributions of the seminars in developing, from field data, education costs in the health professions.

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*The professions were selected because it was presumed that only in these professions did independent research and/or patient care activities assume large proportions. In the remaining professions, except osteopathy, which was treated identically with medicine, all research and patient care costs were allocated to education.

The remainder of this section describes the approach taken by each of the three panels in defining the resources required for first degree education, and outlines the procedures used at the seminars for constructing the institution.

The Approach by Profession. In medicine, the panelists based their judgments on the current education philosophy in this country. No attempt was made to set normative standards for educational institutions or to anticipate future educational programs. The constructed costs model in medicine was developed to define "what is" rather than "what should be."

In dentistry, the panel believed that historical financing patterns for dental schools have resulted in inadequate clinical facilities for the education of the modern dentist. Their constructed model, therefore, reflects the clinical requirements for an adequate dental education.

Because of the severe time constraints of the study, the purpose of the constructed costs seminar in veterinary medicine was limited to defining the basic science and clinical education program for first degree students, and the associated faculty requirements. Non-faculty resources and support costs were not determined for the veterinary model.

Constructing the Institution. Seminar participants in medicine and dentistry were divided into three workshops--one each for the basic and clinical sciences and one for the administrative functions. The first two workshops were assigned the task of determining faculty requirements in their respective areas, estimating the size of the clinical facilities, and providing faculty support requirements. The administrative workshop estimated general support requirements and developed allocation rules to produce program costs based on the findings of the other two workshops.

The first step in the modeling process was the determination of faculty size in the basic science and clinical disciplines. Full-time equivalent (FTE) faculty requirements for instruction were based on the hours of instruction required for a class size of 100 first degree students and on assumptions about the average faculty work-year. Recognizing that faculty are required to perform other related tasks in addition to instructing first degree students, the panelists developed an average profile for a faculty member in the basic and clinical sciences areas. This profile included activities related to the instruction of first degree students as well as graduate student instruction, research and patient care which are essential to the first degree education program.

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*An example of the materials and questionnaire used in preparation for the Dentistry Seminar is provided in Attachment 5.

Based on the average faculty profile and the FTE instructional faculty requirements, the panelists constructed the simplest model of an institution whose sole objective is first degree education. In the judgment of the panelists, the level of research, patient care, and graduate instruction activities in this model were significantly below the level where they could economically produce useful outputs by themselves.

The panelists felt that the simple educational model was not sound since it could not take full advantage of the research, patient care and graduate education produced simultaneously with first degree education. Therefore, they decided to expand these activities to the level where they could economically produce independent outputs. However, in this model of the multi-purpose institution, the additional reserach, patient care and graduate education represents that amount required--and no more--to produce independent outputs and thus take advantage of the economies of joint production; the education of first degree students remains the primary program of the institution.

After estimating faculty size, the panelists determined the levels of faculty support from secretarial and technical staff, space for faculty offices and research, size of the clinical facility, and the number of graduate students and house officers. Next, the general institutional and administrative support costs were estimated; these included items such as the library, institution-wide administration, and computer facilities. Finally, allocation criteria were developed for each item and costs were allocated to the major programs of the institution--first degree education, graduate and house officer education, research and patient care. Education costs for first degree students were divided by the number of students--400--to compute costs per student for the constructed model.

Use of Constructed Costs in the Cost Study

The constructed costs effort assisted the study group in developing the judgments to define education costs, in understanding the nature of joint costs and the economics of the multi-purpose institution, and in testing the sensitivity of costs to changes in the model.

Defining Education Costs. The principal contribution of the constructed costs seminars was that they enabled the study group to define and compute the costs of research and patient care activities essential to education.

Based upon seminar judgments, the study group developed methods for estimating the amount of research essential to education. These methods are expressed as a ratio of faculty time in instruction activities, and were applied to the cost data from the sample of schools in the study. Table C-1 shows the computations used in developing these ratios for medicine, dentistry, and veterinary medicine.

Patient care costs essential to education were computed based on constructed cost judgments as follows:

- The medicine panel felt that the time spent by faculty in joint teaching and patient care activities is sufficient to maintain the faculty member's clinical skills; therefore, the full cost of this joint activity should be allocated to education. This recommendation was incorporated in the computation of education costs for each sampled school in the study.

- In dentistry, the panelists judged that all supervised patient care in the student clinics should be included in instruction costs, and that the indirect costs of intramural clinics for the faculty's private patient care should be included in education costs since this is necessary to maintain the faculty's clinical skills. The study group adopted both recommendations in computing education costs for each sampled dental school. It was not possible, however, to separate the costs of the intramural faculty clinics; therefore the full cost of independent patient care activities of faculty were included in instruction costs.

- The veterinary medicine panel judged that supervised patient care in teaching clinics should be included in instruction costs; and that a portion of the faculty's professional consultations on patient referrals should be included in education costs. These judgments were incorporated into the computation of education costs for each sampled school of veterinary medicine. The study data, however, did not distinguish professional consultations on patient referrals from other patient care activities of faculty; therefore, the full cost of patient care activities was included in education.

Understanding Joint Relationships. The deliberations of the constructed costs panels regarding the general environment of health professional schools, particularly the dominance of various joint relationships, was especially useful to the study group in developing ways of allocating joint activities to programs. Specifically, the panelists endorsed the study group's marginal analysis approach for allocating joint teaching and patient care as well as joint teaching and research activities. The panelists' discussion regarding the education process enabled the study group to better

TABLE C-1

Estimating Faculty Research Time Essential to First Degree Education

Workshop	(1) Faculty time in instruction	(2) Faculty time in research essential to education	(3) Hours of research needed per hour of instruction [(2) ÷ (1)]
Medicine			
Basic sciences	45%	30%	.67
Clinical sciences a/	16	5	.30
Dentistry			
Basic sciences	45	30	.67
Clinical sciences	50	10	.20
Veterinary Medicine			
Basic sciences	40	10	.25
Clinical sciences	50	5	.10

a/The ratio of 0.30 for clincial medicine was calculated as follows:

- Based on an analysis of the constructed cost curriculum, the nine hours per week spent by faculty in instruction of M.D. students was divided into didactic instruction (40 percent) and supervised patient care (60 percent).

- The 60 percent in supervised patient care, equal to 5.4 hours of faculty time, was then adjusted to reflect the amount of marginal teaching time in the joint activity. Consistent with the field data, approximately 50 percent was allocated to patient care and the remaining 50 percent or 2.7 hours was allocated to instruction.

- The original nine hours in instruction was then reduced by the 2.7 hours allocated to patient care, leaving an adjusted instructional figure of 6.4 hours per week. *This adjustment was necessary to make the definition of instruction in the constructed cost model consistent with the definition used in the field data.*

- The 6.4 hours in instruction and the 2 hours in research per week were then converted to percentages of faculty time, yielding 16 percent and 5 percent, respectively.

- Dividing 5 percent by 16 percent produces a ratio of .31 hours of research per hour of instruction, which was rounded to .30.

understand the role of research and patient care activities, and graduate education in the education of first degree students. In addition, it was useful for understanding the relationship of the amount of these activities needed for first degree education to the independent programs being carried on in research, patient care and graduate education.

In dentistry, the constructed costs deliberations provided the study group with insights into the clinical education process, as well as the important role played by the financing of intramural patient care clinics and their costs. Veterinary medicine constructed costs elucidated the nature of clinical instruction in this profession, and provided insights into the independent patient care activities of clinical faculty members.

Insights for Cost Variation. The third major contribution of the constructed costs approach was that it helped identify some of the major factors that lead to variation in costs among institutions in the same profession. The basic sciences workshop in medicine, for example, estimated the changes in faculty size for instruction that would occur if certain assumptions were adjusted:

- If the total number of instructional hours in the basic sciences are reduced from 1,800 to the national median of 1,708, the faculty size would decline by five percent.

- If the class size in lab/conference is decreased to 10 from 12.5 students, instructional faculty size could increase by 16 percent.

- If the class size in lab/conference is increased to 16, instructional faculty size could decrease by 10 percent.

In short, by adjusting some of the assumptions of the constructed model, the sensitivity of costs to variations in curriculum structure, particularly its length, its distribution by mode, and class size was made clear.

Attachment 1 to Chapter 2

THE CONSTRUCTED COSTS MODELING PROCESS: SEMINAR PROCEEDINGS

The constructed costs seminars in medicine and dentistry consisted of workshop sessions in three areas--the basic sciences program, the clinical sciences program, and the administrative program--and plenary sessions where the entire group reviewed the decisions made in the workshops. The workshops, made up of ten or fewer participants, were small enough to allow active debate, and, in addition, allowed participants to concentrate on their area of expertise.*

Due to the time limitations of the study, the objective of the veterinary medicine seminar was limited to identifying the amount of faculty research essential to first degree education, and all deliberations took place in a single session. No effort was made to develop an administrative model; the participants specified only the curricula in the basic and clinical sciences, and the faculty size associated with those curricula.

The four major tasks of the medicine and dentistry panels were to:

- define a faculty size in the basic and clinical sciences
- estimate non-faculty resources requirements
- define the administrative support and faculty requirements
- allocate the resulting costs among programs.

Each task is discussed below:

Defining Faculty Size

This task consists of eight steps which lead to a total faculty size needed in the constructed model of a multi-purpose institution.

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*Generally, participants were assigned to workshops according to their area of expertise, but each workshop was balanced by one or two participants who might represent the other two areas.

Step 1

Determining the required amount of instructional time for each first degree student. The panelists determined the number of instructional hours in the basic sciences and the number of weeks in the clinical program required by each student.

Step 2

Distributing the total instructional time by subject areas and modes of instruction. Subject areas, rather than departmental structures or individual course listings were used to facilitate general discussion about these requirements. Eight modes of instruction were defined for subject areas in the basic and clinical sciences:

> *Lecture:* Assigned didactic learning that consists of communication of pre-determined information from faculty to students. This material is generally prepared by faculty individually or jointly for a relatively large number of students.
>
> *Laboratory:* Conducting experiments to demonstrate principles, analytical techniques, and procedures. Students are taught in multidisciplinary laboratories that provide each student with one laboratory area for all basic science studies, except gross anatomy, which requires more varied physical facilities.

Demonstration/Conference: Small group instruction that includes active student participation.

Counseling: Individual conferences between a faculty member and a student.

Tutorial: Special assistance instruction involving one or more students.

Self-instruction: Students' use of programmed learning materials without the presence of faculty, but prepared and updated by faculty. It is assumed that faculty members would be available for consultation with students during self-instructional time.

Examinations: Testing of students' knowledge periodically during the length of the curriculum.

Supervised Patient Care: Faculty rounds, ward rounds, chart rounds, and individual supervision by clinical faculty, where students learn as care is provided to inpatients and outpatients.

Dental Laboratory: Development of manual and technical skills essential for dentists in the performance of their clinical activities.

Step 3.

Determining the number of students in each section, by mode. Class size and faculty/student ratios were defined for each mode of instruction.

Step 4.

Estimating the faculty preparation and evaluation time per faculty contact hour, by mode of instruction.

Step 5.

Calculating the FTE faculty size for instruction. Using the assumptions specified in Steps 1 through 4, the total number of faculty hours needed for direct instruction was calculated. Added to these numbers were the estimates of faculty time needed in preparation and evaluation of instructional material. The total number of faculty hours needed for instruction was divided by the number of hours used by the panelists to constitute a man-year, in order to calculate the FTE faculty for instruction.

Step 6.

Estimating the amount of faculty time in other activities essential to the first degree program in a simple educational model. Recognizing that the definition of first degree education includes more than the instructional activities, the panelists identified the other activities essential to the first degree education program, and arrived at a consensus on the distribution of faculty time among instruction and other activities.

Table C-1 summarizes the judgments of the panelists on faculty activities essential for the first degree education program and the faculty size needed for the activities.

Step 7.

Calculating an adequate faculty size for M.D. education. Having estimated the FTE faculty necessary for first degree education, the panelists determined whether this faculty size was adequate to:

- cover the variety of courses offered in each subject area

- cover scheduling problems

- provide a critical intellectual mass within each discipline.

TABLE C-1

Distribution of Faculty Size in the Sample Education Model, by Activity

Seminar	Faculty activity	Percent of faculty time	Faculty size (in FTE's)
Medicine			
Basic sciences:	Instruction of M.D. students	45%	17.8
	Research	30	11.9
	Graduate instruction	10	4.0
	Public service, writing and professional development	15	5.9
Total		100	39.6
Clinical sciences:	Insturction a/	33	51.7
	Research	20	31.3
	Patient care	37	58.0
	Administration	10	15.7
Total		100	156.7
Dentistry			
Basic sciences:	Instruction of D.D.S. students	45%	7.1
	Research	30	4.7
	Non-D.D.S. instruction	10	1.6
	Public service, etc.	15	2.3
Total		100	15.7
Clinical sciences:	Instruction of D.D.S. students	50	30.0
	Research	10	6.0
	Patient care	20	12.0
	Public service, etc.	10	6.0
	Graduate and other instruction	10	6.0
Total		100	60.0

NOTE: The Veterinary Medicine Workshop did not construct the simple educational model.

a/Approximately 70 percent of this time should be directed to first degree students, with the remainder directed to house officer instruction.

In three workshops--basic sciences medicine and dentistry, and clinical dentistry--the panelists increased the FTE faculty on the basis of these criteria. No increase in faculty size above the educational FTE's was recommended by the clinical sciences workshop in medicine. This issue was not considered in veterinary medicine because of the limited time for that seminar.

Step 8.

Calculation of the total faculty size needed in a multi-purpose institution. Recognizing that the simple educational model did not take advantage of the research, patient care, and graduate education produced jointly with first degree student education, the panelists increased the size of these activities to a level where they could produce independent outputs in a multi-purpose institution.

Table C-2 summarized the judgments of the panelists on faculty activities in a multi-purpose institution.

Estimating Non-Faculty Resource Requirements

Having determined faculty size, the panelists in medicine and dentistry estimated the following non-faculty resources needed to support the basic and clinical sciences programs:

- clerical and technical support personnel

- graduate students and house officers

- size of clinical facilities

Defining the Administrative Support and Faculty Requirements

This task consists of three steps for defining the costs and physical space requirements for the basic and clinical sciences programs and the administrative and centralized support activities of a multi-purpose institution.

Step 1.

Estimating the personnel costs associated with the basic science and clinical science programs developed by those workshops

Step 2.

Determining the departmental facilities, and equipment required by the basic and clinical sciences' education programs and the annual operating costs associated with those requirements

TABLE C-2

Percentage Distrubtion of Required Faculty Size by Activity

Multi-Purpose Institution

Seminar	Faculty activity	Percent of faculty time	Faculty size (in FTE's)
Medicine			
Basic sciences:	Instruction of M.D. students	20%	17.8
	Research	50	44.5
	Graduate instruction	15	13.3
	Public service, writing and professional development	15	13.4
Total		100	89.0
Clinical sciences:	Instruction a/	27	NA
	Research	36	
	Patient care	30	
	Administration	7	
Total		100	
Dentistry			
Basic sciences:	Instruction of D.D.S. students	26	7.1
	Research	50	13.8
	Non-D.D.S. instruction	10	2.7
	Public service, etc.	14	3.9
Total		100	27.5
Clinical sciences:	Instruction of D.D.S. students	32	30.0
	Research	19	18.0
	Patient care	19	18.0
	Public service, etc.	9	9.0
	Graduate and other instruction	21	20.0
Total		100	95.0
Veterinary Medicine			
Basic sciences:	Instruction of D.V.M. students	40%	20.4
	Research	25	12.7
	Graduate instruction	20	10.2
	Public service and extension	5	2.6
	Administration	10	5.1
Total		100	51.0
Clinical sciences:	Instruction of D.V.M. students	50	21.9
	Research	20	8.8
	Clinical consultations	20	8.8
	Public service/extension	5	2.2
	Administration	5	2.1
Total		100	43.8

a/Approximately 70 percent of this time should be directed to first degree students, with the remainder directed to house officer instruction.

Step 3.

Estimating the space and resource requirements, and their costs, for all administrative and centralized support activities.

Distributing Costs Among Programs

A three step process was used for allocating total costs to programs to obtain average per student costs. First, faculty costs that were associated with only one program were assigned directly to that program. Second, the costs of faculty time that contribute to more than one product--joint costs--were distributed in proportion to the total size of the programs benefiting from the joint costs. Third, based on the final distribution of faculty costs and certain assumptions on the use of supportive resources and facilities, a series of allocation rules were developed for allocating these costs to programs. Detailed specifications on these allocation rules for Medicine and Dentistry are found in Section D of Attachments 2 and 3.

Attachment 2 to Chapter 2

DELIBERATIONS OF THE CONSTRUCTED COSTS SEMINAR IN MEDICINE

The constructed costs model in medicine was designed by seventeen medical educators during a two-and-one-half-day seminar in July, 1973. The participants developed a model of the human, physical, and financial resources necessary for providing a good undergraduate medical education. This attachment presents the results of the constructed costs seminar in medicine. Section A describes the deliberations of the Basic Sciences Workshop, Section B the Clinical Sciences Workshop, and Section C, the Administrative Workshop. The total costs of the constructed institution and the distribution of total costs to the M.D. program are provided in Section D.

Section A

Basic Sciences Workshop in Medicine

Defining a Curriculum

Length of Time. The basic sciences curriculum is based on 63 weeks or 1,800 hours of direct faculty contact in basic science instruction for a class size of 100 medical students. The following assumptions were used to determine the length of the curriculum:

- thirty-six weeks constitutes an average academic year. One and three-fourths years, or 63 weeks, should be devoted to basic science instruction

- a forty-hour week makes up a week of instruction for the average student. Of that 40 hours, 28 are scheduled faculty contact time and 12 are for self-instruction. As a result, there are 1,764 required faculty contact hours per average student

- ten percent of the students will not have sufficient educational preparation and will require an additional 20 percent faculty time for remedial instruction. For those students, faculty contact hours will increase to 2,117

- average direct faculty contact time of 1,800 hours per student is obtained by computing a weighted average of the 90 students needing 1,764 faculty contact hours, and the 10 students requiring the additional 353 hours of faculty instruction.

Basic Sciences Instructional Time by Subject Area. The 1,800 hours of instructional time were distributed among the basic sciences subject areas by a weighting factor that reflected the panelists' judgment on the relative scope of each subject area. Table CM-1 shows the relative weights, the percentage distribution of total instructional time among subject areas, and the number of hours of faculty instruction required in each subject area. Required electives are included in the total hours specified for each subject.

Modes of Instruction for Basic Sciences. Six modes of instruction were defined for each subject area: lecture, laboratory, conference, counseling, tutorial, and examinations.

Table CM-2 summarizes the number of sections into which a class of 100 students should be divided and the faculty/student ratio required per section for each mode of instruction. *These distributions are considered typical of all basic science subject areas.*

Faculty/Student Contact Hours. The following steps were used to determine total faculty/student contact hours:

- the percent of student time in each mode is multiplied by the number of contact hours in each subject area to obtain direct contact hours per student needed for instruction in each mode

- the resulting number of instructional hours per student is multiplied by the number of sections needed per mode for 100 students.

Table CM-3 shows the results of these calculations.

FTE Faculty Requirements for Instruction

Determining the number of FTE faculty required for the instruction of M.D. students required additional judgments by the panelists.

First they determined the amount of faculty time spent in preparation and evaluation, curriculum planning, and administration directly related to instruction. Table CM-4 presents the number of hours considered necessary for preparation and evaluation per direct contact hour. An additional five percent of a faculty member's time for M.D. instruction was allocated for broad curriculum planning and administration.

Second, the panelists selected, for the purpose of estimating faculty size, an average work year of 2,000 hours which consists of 40 hours a week for 50 weeks.

TABLE CM-1

Distribution of Basic Sciences Hours of Instruction by Subject Area

Subject area	Weighting factor	Percent distribution of instructional hours	Faculty instructional hours per student
TOTAL	9.5	100%	1,800
Anatomy a/	2.0	24	424
Behavioral sciences	0.3	4	62
Biochemistry and genetics	1.5	17	318
Microbiology and immunology	1.0	12	212
Pathology	1.5	17	318
Pharmacology	1.0	12	212
Physiology	1.0	12	212
Statistics, biometrics, and epidemiology	0.2	2	42

a/Includes Gross Anatomy, Microscopic Anatomy, Neuro Anatomy, Developmental Anatomy, and Cell Biology.

TABLE CM-2

Summary of Characteristics of Basic Sciences Modes of Instruction

Mode of instruction	Percent distribution of student time	Number of sections per 100 students	Faculty-student ratio
Lecture	45	1	1 to 100
Laboratory	30	6	1 to 16
Conference	15	12	1 to 8
Counselling	6	100	1 to 1
Tutorial	2	50	1 to 2
Examinations	2	4	1 to 25

TABLE CM-3

Faculty/Student Contact Hours by Mode of Instruction

Mode of instruction	Instructional hours	Number of sections per 100 students	Faculty/student contact hours (hours X sections)
TOTAL	1,800		20,034
Lecture	810	1	810
Laboratory	540	6	3,240
Conference	270	12	3,240
Counselling	108	100	10,800
Tutorial	36	50	1,800
Examinations	36	4	144

TABLE CM-4

Preparation and Evaluation Time Per Direct Contact Hour by Mode of Instruction

Mode of instruction	Preparation and evaluation hours	
	Per direct contact hour	Total
TOTAL	--	13,860
Lecture	4.0	3,240
Laboratory	0.5	1,620
Conference	2.0	6,480
Counselling	0	0
Tutorial	1.0	1,800
Examination	5.0	720

Table CM-5 displays the computation of the number of FTE basic science faculty needed for medical student instruction. Of the total hours needed for instruction, 60 percent is spent in student contact time, 35 percent in preparation and evaluation, and 5 percent in curriculum planning and administration.

FTE Faculty Requirements for Education

The Education Model. In addition to faculty time needed for M.D. instruction, the panelists agreed that basic scientists must spend time on other activities--most importantly research and instruction of graduate students--to provide a complete program of undergraduate medical education. The panelists' first approach to determining how much faculty time should be devoted to these activities was to develop a model of a medical school defined as an institution where M.D. education is the primary program. In this institution, activities that contribute to research or graduate education are included only to the extent that they are essential to the production of M.D. graduates; no independent research or graduate education is carried on for its own sake.

The following assumptions were used to translate the 17.8 FTE faculty needed for M.D. instruction--hereafter represented by the symbol I_M--to an FTE faculty for M.D. education, E_M:

- a faculty member must spend 30 percent* of his time in research activities to maintain his competence as an instructor of medical students. This variable is represented as R_M
- a graduate education program (M.S., Ph.D.) is necessary to obtain accreditation and high quality faculty for an undergraduate medical education program. Faculty time spent on the instruction of graduate students is estimated at 10 percent of total FTE faculty time for M.D. education. This variable is represented as I_O
- a faculty member should spend 15 percent of his time in public service activities, professional development, and writing. Of that 15 percent, three percent should be spent in public service activities (S), seven percent in professional development (D), and five percent in writing (W). The combination of these activities is represented by the symbol SDW_M.

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*The 30 percent assumption was made by the Subcommittee of the Basic Sciences panel at a subsequent meeting scheduled to review the Airlie House decisions. The full panel had originally fixed this parameter at 35 percent. The adjustment resulted from an analysis of total research time in state schools which showed that 30 percent represented the minimum research time in state schools.

TABLE CM-5

FTE Basic Science Faculty Needed for M.D. Instruction

(1)	Total hours of direct contact time	20,034
(2)	Total hours of preparation and evaluation	13,860
(3)	Curriculum planning and administration	1,695
(4)	Total hours needed for instruction	35,589
(5)	Number of FTE's for instruction (row 4 ÷ 2,000)	17.8

As shown in Table CM-6, the 17.8 FTE basic science faculty represent 45 percent of total faculty FTE's for instructing medical students. The total faculty requirement is computed by dividing the 17.8 instructional FTE's by 0.45, giving 39.6 basic science faculty for education in the education model. The distribution of these 39.6 FTE's to activities is displayed in Table CM-6.

Having determined the FTE faculty necessary for medical education, the panelists were asked whether these 39.6 FTE's provided adequate faculty size to:

- cover the variety of courses offered in each subject area

- cover scheduling problems

- provide a critical intellectual mass within each discipline.

The panelists re-evaluated FTE faculty judgments in light of these criteria and adjusted actual faculty size. Table CM-7 presents a comparison of numbers of FTE faculty with numbers of actual faculty by subject area. The increase in Pathology reflects the patient care activities required of faculty in this discipline.

Although 50 faculty are adequate to carry on the education program, only 39.6 FTE's, or 79 percent of the total faculty time available is absorbed in activities directly related to the M.D. education program. The remaining 21 percent of the time available to these faculty members can be directed toward graduate education and independent research. The distribution of faculty time based on a faculty size of 50 is shown in Table CM-8. The difference between the percentage distribution of time in Tables CM-6 and CM-8 is due to the presence of the additional faculty resources. Since the education model was not designed to take advantage of this additional time, the panelists developed a multi-product model.

The Multi-Purpose Institution Model. Recognizing that the education model is neither a reasonable representation of reality nor a complete model for the purposes of cost determination, the panelists developed a model of a complete medical school with independent programs in research and graduate education. Although these activities in the multi-purpose institution could result in independent outputs, the constraints of the constructed costs process limited the size of these activities to a level consistent with an institution whose primary focus remained M.D. education. Thus, no resources were estimated for large scale research institutes or graduate education programs.

An adequate faculty size for the multi-purpose institution (MP) was developed from the following assumptions:

- the number of FTE's needed to carry out the M.D. instruction program (I_M) remains at 17.8

- 15 percent of basic science faculty time should be directed toward graduate and allied health instruction and its related administration

TABLE CM-6

FTE Basic Science Faculty Required for Medical Education

Activity	E_M	=	I_M	+	I_O	+	R_M	+	SDW_M
Percent distribution of time	100%	=	45%	+	10%	+	30%	+	15%
FTE faculty required	39.6	=	17.8	+	4.0	+	11.9	+	5.9

TABLE CM-7

Comparison of FTE and Actual Faculty Needed for M.D. Education

Subject area	FTE faculty	Actual faculty
TOTAL	39.6	50.0
Anatomy	9.5	10.0
Behavioral science	1.0	1.0
Biochemistry and genetics	6.9	9.0
Microbiology and immunology	4.7	7.0
Pathology	6.9	9.0
Pharmacology	4.8	6.0
Physiology	5.0	7.0
Statistics, etc.	0.8	1.0

TABLE CM-8

Computation of Faculty Required for Medical Education

Activity	E_M	=	I_M	+	I_O	+	R_M	+	SDW_M	+	Additional time
Percent distribution	100%	=	35%	+	8%	+	24%	+	12%	+	21%
FTE faculty required	50	=	17.8	+	4.0	+	11.9	+	5.9	+	10.4

- 50 percent of total basic science faculty time should be devoted to research activities (R) in order to produce a viable, independent research program. Included in the 50 percent would be research essential to education (R_M), research essential to graduate education (R_G),* and independent research (R_R) conducted in response to national research priorities. Included in all three of these activities is time for the administration of research activities

- as in the education model, a faculty member should spend 15 percent of his time in public service activities, professional development, and writing (SDW).

Table CM-9 shows the distribution of time and FTE faculty in a multi-purpose institution.

Graduate Student Program

It was estimated that in an education model each of the 50 faculty members would need one-half of a graduate student in order to conduct the limited research program essential to medical education. However, in a multi-purpose institution, where half of total faculty resources are available for research activities, the panelists determined that approximately two graduate students should be allocated to each faculty member, resulting in a graduate program of 180 students.

Non-Faculty Support Personnel

The panelists concluded that the clerical needs of faculty in both the education and multi-purpose institution models would be met by providing 0.4 clerical staff per faculty member. In the medical education program, where there are 50 faculty, this results in 20 clerical positions. In the multi-purpose institution, where there are 89 faculty, a clerical staff of 36 FTE's is needed.

Twenty technical personnel were considered necessary for the medical education program. The number of technicians reflected varying requirements of different subject areas. Table CM-10 presents the distribution of those personnel. Additional requirements for technicians in a multi-purpose institution were based on the following judgments regarding the ratio of technicians to faculty:

- 0.25 technicians to each FTE engaged in the pure instruction of graduate and other students

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*The panelists estimated that faculty time spent in research essential to graduate education should be equal to faculty time spent in the direct instruction of graduate students.

TABLE CM-9

Distribution of Basic Science Faculty Required in a Multi-Purpose Institution, by Activity

Activity	MC	=	I_M	+	I_O	+	R	+	SDW
Percent distribution of time	100%	=	20%	+	15%	+	50%	+	15%
FTE faculty required	89.0	=	17.8	+	13.3	+	44.5	+	13.4

TABLE CM-10

Distribution of Technical Personnel by Subject Area in the Medical Education Model

Subject area	Number of technical personnel
TOTAL	20
Anatomy	5
Biochemistry and genetics	2
Behavioral science	0
Microbiology and immunology	3
Pathology	5
Pharmacology	2
Physiology	3
Statistics, etc.	0

- 1.5 technicians to each FTE engaged in independent research activities

- 1 technician to each FTE engaged in research in the presence of graduate students.

Table CM-11 displays the number of technical personnel resulting from these ratios.*

Summary

The basic sciences workshop developed a 63 week, 1,800 hour curriculum for a class of 100 medical students. They distributed that time among broad subject areas and defined five modes of instruction for each subject area.

As a result of these judgments, 20,034 direct contact hours between faculty and students were calculated as necessary for the instruction of M.D. students. When preparation, evaluation, and administration time were determined, the total hours needed for instruction increased to 35,589. Based on a work year of 2,000 hours, 17.8 FTE's are needed for M.D. instruction.

In an education model where faculty spend time in other activities--namely research and graduate education--only to the extent that those activities are essential to M.D. education, the number of basic science FTE's increases to 39.6. However, those FTE's do not take account of "critical mass" of faculty needed by a functioning institution. When the FTE's were re-evaluated with regard to these considerations, the number of faculty increased to 50 in the education model.

A multi-purpose institution--in which independent research and graduate education programs exist along with medical education--utilized that additional faculty time and is a reasonable representation of an actual medical school. Faculty spend a total of 20 percent of their time instructing medical students, 15 percent instructing graduate students, 50 percent in research activities, and 15 percent in public service activities, professional development, and writing. This institution requires 89 FTE faculty, 35.6 FTE clerical personnel, and 73 technicians.

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*The FTE base used to compute the number of technical personnel reflects the 13.4 FTE's allocated to SDW and already distributed on a proportional basis to I_M, I_O and R, thereby increasing the FTE's in those programs proportionately. See Part D for further explanation of this computation.

TABLE CM-11

Distribution of Technical Personnel by Activity in the Multi-Purpose Institution

Activity or program	Number of technicians
TOTAL	73
Medical education	20
Pure instruction of graduate students	3
Independent research	34
Research with graduate students present	16

Section B

Clinical Sciences Workshop in Medicine

Defining the Curriculum

Length of Time and Clinical Experiences. The clinical sciences curriculum is based on two years of clinical experience for a class size of 100 medical students. It consists of 50 weeks of required instruction and 30 weeks of electives in major clinical areas, totaling 80 weeks of instruction distributed among the clinical disciplines shown in Table CM-12.

Modes of Instruction for Clinical Experiences. Three modes of instruction were defined for each clinical area: lecture, conference, and supervised patient care.

Table CM-13 summarizes the number of sections into which a class of 100 students should be divided and the faculty/student ratio required per section for each clinical area.

Faculty/Student Contact Hours. A total of 9,136 faculty/student contact hours were determined by multiplying, for each clinical area, the hours of instruction per week in each mode by the number of sections per mode for 100 students. Table CM-14 shows the results of these calculations.

FTE Faculty Requirements for Instruction

The panelists considered the amount of faculty time spent in activities such as preparation and evaluation that are directly related to instruction, but not included in scheduled teaching hours. The panelists concluded that an average of two and one-half hours of preparation are necessary for every hour of lecture, and that one hour of preparation is necessary for every hour of conference instruction. The panel agreed that supervised patient care requires no formal preparation time. Table CM-15 presents the hours needed for preparation and evaluation in each clinical area.

They then selected, for the purpose of estimating faculty size, an average work year of 2,000 hours which consists of 40 hours a week for 50 weeks.

Table CM-16 displays the computation of the number of FTE clinical faculty needed for medical student instruction. The process consists of three steps:

- weekly instruction requirements for each discipline are determined by adding the direct contact hours to the time needed for preparation and evaluation

TABLE CM-12

Distribution of Clinical Instruction by Discipline

Clinical experiences	Weeks of instruction		
	Required	Elective	Total
TOTAL	50	30	80
Medicine	12	12	24
OB/GYN	4	0	4
Pediatrics	8	6	14
Physical diagnosis	6	0	6
Psychiatry	6	0	6
Surgery	8	6	14
Family medicine	6	0	6
All electives (other)	0	6	6

TABLE CM-13

Summary of Characteristics of Clinical Sciences Modes of Instruction

Characteristics	Mode of instruction		
	Lecture	Conference	Supervised patient care a/
Weekly instruction hours per clinical experience			
Medicine OB/GYN Pediatrics Surgery Family medicine Electives	2	6	20
Physical diagnosis	10	10	20
Psychiatry	4	12	20
Number of sections per 100 students	8	16	50
Faculty/student ratio per section	1:12	1:6	1:2

a/Includes inpatient and outpatient clerkships.

TABLE CM-14

Faculty-Student Contact Hours by Clinical Area

Clinical experience by mode	Hours of Instruction per week	Number of sections per 100 students	Faculty/student contact hours (hours x sections)
Medicine and 5 other disciplines a/			
Lecture	2	8	16
Conference	6	16	96
Supervised Patient care	20	50	1,000
Total	28		1,112 x 6=6,672
Physical diagnosis			
Lecture	10	8	80
Conference	10	16	160
Supervised Patient care	20	50	1,000
Total	40		1,240
Psychiatry			
Lecture	4	8	32
Conference	12	16	192
Supervised Patient care	20	50	1,000
Total	36		1,224

a/Includes OB/GYN, Pediatrics, Surgery, Family Medicine and Other Electives.

TABLE CM-15

Total Hours of Preparation and Evaluation by Clinical Area

Clinical experience by mode	Total hours
Total	1,448
Medicine plus 5 other disciplines a/	
Lecture	40
Conference	96
Supervised patient care	0
Sub-total	136 x 6 = 816
Physical diagnosis	
Lecture	200
Conference	160
Supervised patient care	0
Sub-total	360
Psychiatry	
Lecture	80
Conference	192
Supervised patient care	0
Sub-total	272

a/Includes OB/GYN, Pediatrics, Surgery, Family Medicine, and Other Electives.

TABLE CM-16

FTE Faculty Needed for M.D. Instruction

Clinical experience	Hours of faculty time for instruction/week	Number of weeks/ clinical experience	Total hours needed for instruction (hours x weeks)	FTE faculty needed for instruction (total hours ÷ 2000)
Total			103,648	51.7
Medicine	1,248	24	29,952	15.0
OB/GYN	1,248	4	4,992	2.5
Pediatrics	1,248	14	17,472	8.7
Physical diagnosis	1,600	8	12,800	6.4
Psychiatry	1,496	4	5,984	3.0
Surgery	1,248	14	17,472	8.7
Family medicine	1,248	6	7,488	3.7
Other electives	1,248	6	7,488	3.7

- total annual faculty hours needed for instruction are computed by multiplying the weekly requirements by the number of instructional weeks in each discipline

- FTE faculty requirements are obtained by dividing the total instructional hours by 2,000--the hours in an average work year.

FTE Faculty Requirements for Education

The basic sciences panel constructed an institution in which faculty spend time in activities other than M.D. education only to the extent that those activities are essential to the M.D. education program. However, the clinical panel believed that the nature of clinical instruction is such that patient care is necessarily produced simultaneously with education. Moreover, the clinical faculty member assumes responsibility for the total care provided to patients, not simply the portion of care provided in an instructional setting.

The following assumptions were used to translate the 51.7 FTE faculty needed for M.D. instruction--hereafter represented by the symbol I--to a faculty for an institution that exists primarily to educate students, but also has other products (MP):

- a clinical faculty member may be expected to spend 13 hours a week in instruction (I). This activity encompasses all three modes of instruction, and includes--in the supervised patient care mode--joint teaching/patient care provided in a clinical setting. Instruction represents one-third of the faculty member's time during a 40 hour week

- clinical research (R_E) should constitute eight hours per week. This is necessary to maintain a faculty member's skill and to keep him current in his discipline. This represents one-fifth of the faculty member's time in a 40 hour week

- the clinical faculty member requires 15 hours per week to provide patient care in addition to the care provided jointly with student instruction. This patient care (PC) is necessary to care for the patients needed for clinical instruction; it represents slightly more than one-third of a 40 hour week

- finally, a faculty member has certain administrative duties associated with educating medical students (A_E) that would require four hours a week, or one-tenth of a 40 hour week.

As shown in Table CM-17, the 51.7 FTE clinical faculty represent 33 percent of total faculty FTE's for instructing medical students. The total faculty requirement is computed by dividing the 51.7 instructional FTE's by 0.33. The result is an institution with 157

TABLE CM-17

Faculty Required for Education in a Multi-Purpose Institution

Activity	MP	=	I	+	R_E	+	PC	+	A_E
Percent distribution of time	100%	=	33%	+	20%	+	37%	+	10%
Faculty required	156.7	=	51.7	+	31.3	+	58.0	+	15.7

clinical faculty. The distribution of these 157 faculty to activities is displayed in Table CM-17.

Having determined the clinical faculty necessary to operate an institution where the primary focus is M.D. education, the panelists agreed to redistribute the 157 faculty based on two additional components that result in a more realistic institution:

- a house officer program necessary for cover the clinical facilities considered necessary for medical student education

- an average clinical faculty work week of 60 hours.

House Officer Program. The clinical panel specified the clinical facilities required to educate 200 medical students. Assumptions were made on the average occupancy rates and length of stay, the number of new patients required per week for instruction, and the distribution of clinical exposure between inpatients and outpatients. The clinical panel determined that a 600 bed inpatient facility and 74,500 outpatient visits a year would be required for educating 200 medical students. The section on *Clinical Facilities* details how these estimates were determined.

The clinical panel agreed that the 600 bed inpatient facility would require 150 house officers who would be expected to spend two-thirds of their time on inpatients and the remainder in outpatient clinics. These house officers would require 92,500 outpatient visits a year in addition to those specified for medical students, resulting in a total of 167,000 visits annually, or an average of 22 visits per week for each house officer.*

The panel agreed that house officers would provide eight of the 20 hours of supervised patient care provided each week to medical students, reducing faculty responsibilities to 12 hours per week. On the other hand, each house officer would require about three-fourths of the amount of instruction provided to a medical student; the faculty would provide house officer instruction only to the extent their responsibilities were reduced and the balance would be provided by senior house officers. *Total clinical faculty would, therefore, remain unchanged, but the distribution of faculty time would change; each clinical faculty member would divide time for educating students between house officers and medical students.* Table CM-18 shows the allocation of that time during a 40 hour week.

Sixty Hour Week. Although the number of clinical faculty required for medical education is based on a 40-hour workweek--as for the basic sciences program--the clinical panel felt that this is not a realistic basis on which to construct a model of clinical medical education. The panel agreed instead, that clinical faculty should average 60 hours a week; however, the additional 20 hours

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*The panel felt that the institution could take advantage of inpatients as well as outpatients for the joint training of medical students and house officers.

TABLE CM-18

Distribution of Clinical Faculty Time to Medical Student and House Officer Education During 40 Hours a Week

Activity	MC	=	I	+	R_E	+	PC	+	A_E
Total hours	40	=	13	+	8	+	15	+	4
Hours to medical student education	18	=	9	+	2	+	5	+	2
Hours to house officer education	22	=	4	+	6	+	10	+	2

would *not change the number of faculty produced by the 40-hour workweek, but would merely represent a realistic estimate of clinical faculty time.* This additional time would be spent by faculty in professional development, independent research unrelated to education, and community and professional services. Table CM-19 presents the new distribution of faculty time resulting from the addition of the 20 hours.

Clinical Facilities

As described briefly in the section on *House Officers,* the clinical panelists specified that a 600 bed inpatient facility and 74,500 outpatients a year would be required to educate 200 medical students.

The following judgments were made in determining the size of the inpatient facility:

- physical diagnosis, which is usually taught during the first two years of the medical education program, was not included in the clinical disciplines for the purpose of this computation. Therefore, the number of weeks of clinical experience on which the size of the clinical facility is based is reduced from 80 to 74 weeks

- an average of three new patients would be assigned to a medical student each week

- the length of stay for patients would average nine days

- in selected clinical areas students would distribute their time between inpatient and outpatient responsibilities

- there would be an average occupancy rate of 85 percent.

The results of these assumptions were applied to each clinical area in the following steps:

- the average number of new patients per week, per student, is multiplied by the average length of stay and the result divided by 7 days to determine the average number of beds per week required per student in a clinical area

- the average number of students assigned to each clinical discipline is then computed by dividing the number of instructional weeks in each area--see Table CM-12--by 74 (80 less 6 weeks of physical diagnosis) and multiplying by 200 students

- the average number of students is multiplied by the number of beds required per student per week

TABLE CM-19

Distribution of Faculty Time in the Clinical Sciences During a 60 Hour Week

Activity	Hours	Percent
Total	60	100
Instruction	13	22
Medical students	(9)	
House officers	(4)	
Research related to education	8	13
Medical students	(2)	
House officers	(6)	
Patient care	15	25
Medical students	(5)	
House officers	(10)	
Administration related to education	4	7
Medical students	(2)	
House officers	(2)	
Independent research	11	18
Professional development	5	8
Community service	4	7

to produce the number of inpatients required in each area

- in medicine, pediatrics, family medicine and psychiatry students distribute their time between inpatient and outpatient responsibilities. The percent of weeks in each kind of activity is computed by dividing the number of weeks considered by the panelists to be necessary in inpatient activities by the number of weeks of instruction in each of those clinical areas

- the percent of inpatient weeks in each area is multiplied by the total number of patients required and the product divided by the average occupancy rate of 85 percent to compute the size of the inpatient facility.

Table CM-20 presents these computations by clinical areas.

The following judgments were made in determining the number of outpatient visits required for medical education in each clinical area:

- on the average students should have 6 weeks of outpatient experience

- students should see an average of 20 outpatients per week.

Based on these assumptions, the number of outpatient visits per year was computed using the following steps:

- to produce the total number of outpatient visits required for 200 students, the number of weeks of outpatient experience per student is multiplied by the number of outpatients per student required each week and the product is multiplied by 200

- the total number of outpatient visits per year is divided by 2--the total number of outpatient visits required for 200 students over 2 years--in order to determine the number of outpatient visits required annually.

These computations by clinical area are presented in Table CM-21.

Non-Faculty Support Personnel

Clerical and technical personnel needs were estimated at an average rate of one clerical employee and one technician for every two faculty members. It was estimated that the 79 clerical personnel would spend half their time in support of the direct instructional activities of faculty; the 79 technical personnel would support faculty research activities only.

TABLE CM-20

Inpatient Facilities Required for Educating 200 Medical Students

Clinical area	Number of new patients required per week	Average length of stay	Number of beds per student per week	Average number of students in each area	Total number of patients required	Percent of inpatient weeks per student	Number of beds required
Total							600
Medicine	3	9	3.86	65	251	75	220
Surgery	3	9	3.86	38	147	100	172
OB/GYN	4	6	3.43	11	38	100	44
Pediatrics	3	6	2.57	38	98	50	57
Family medicine	2	4	1.14	16	18	67	16
Psychiatry	1	16	2.29	16	37	67	43
Other electives	2	9	2.57	16	41	100	48

TABLE CM-21

Outpatient Visits Required for Medical Education by Clinical Area

Clinical area	Number of weeks of outpatient experience per student	Number of outpatients per week per student	Total outpatient visits required for 200 students over 2 years	Outpatient visits per year
Total			149,000	74,500
Medicine	6	20	24,000	12,000
Surgery	6	20	24,000	12,000
OB/GYN	4	15	12,000	6,000
Pediatrics	7	25	35,000	17,500
Family medicine	6	25	30,000	15,000
Psychiatry	4	10	8,000	4,000
Physical diagnosis	5	8	8,000	4,000
Other electives	2	20	8,000	4,000

Summary

The clinical sciences workshop developed an 80 week curriculum for 200 students. They distributed those weeks among broad areas of clinical experience and defined three modes of instruction that were applied to each subject area according to the kind of instruction needed in each area.

As a result of these judgments, 9,136 direct contact hours between faculty and students were calculated as necessary for the instruction of M.D. students. When preparation and evaluation time was determined--1,448 hours--and both direct contact time and preparation and evaluation time were associated with the number of weeks in each clinical area, the total hours needed for instruction totaled 103,648. Based on a working year of 2,000 hours, 51.7 FTE are needed for M.D. instruction in the clinical sciences.

In an institution where the education of house officers, patient care, research, and administration are activities that enhance the education of a medical student, the faculty required to carry out these activities and to educate medical students number 157. A clinical faculty of 157 is considered adequate to educate 200 medical students as well as 150 house officers. However, the scope of these educational responsibilities, along with the need for some research, professional development and service activities necessitates a work week in excess of 40 hours.

The "constructed" institution should require a 600 bed inpatient facility, and a total of 167,000 outpatient visits annually--74,000 for medical student education, and 92,500 to educate house officers.

Finally, 79 clerical and 79 technical personnel are needed to provide support to the 157 clinical faculty.

Section C

Administrative Workshop in Medicine

The administrative workshop in medicine:

- estimated the personnel costs associated with the basic science and clinical science programs developed by those workshops
- determined the physical space requirements of the basic and clinical sciences education programs and the annual operating costs associated with those requirements
- estimated space and resource requirements, and their costs, for all other administrative and centralized support activities, and
- distributed all costs among the programs of M.D. education, other education, research, and patient

care, in order to obtain the average per student costs of the M.D. education program.

Section C presents the conclusions of the administrative workshop on the first three of these tasks. Section D describes the methodology for allocating costs among programs and summarizes the assumptions used by the administrative panel.

Estimating the Personnel Costs Associated with the Basic and Clinical Science Programs

The administrative panel estimated total personnel costs for a faculty size of 246 (89 Basic Science faculty and 157 clinicians), 180 graduate students, 150 house officers, 115 clerical employees, and 152 technicians. Table CM-22 displays the average annual salaries used by the administrative workshop in assigning costs to these personnel, and presents the total personnel costs for the full academic program. Other direct operating costs, estimated at seven percent of base salaries (excluding doctoral stipends) include costs such as supplies, travel, printing, and telephone, not related to the research or patient care program. Fringe benefits are calculated at 15 percent of salaries for faculty (including house officers), clerical, and technical staff.

Estimating the Facilities Required for Instruction and Academic Office Space and Annual Operating Costs

The administrative panel estimated the facilities required for all instructional space--classroom, laboratories, conference rooms* --office space for faculty and support staff, and research laboratory space for faculty and graduate students.** Tables CM-23 and CM-24 summarize the methods used in estimating these space requirements and the total annual costs associated with the space. The following assumptions were used in all estimates of requirements:

1. *Net Interior Usable Space* is assumed to be 65 percent of gross space, resulting in a gross to net square foot ratio of 1.5 to 1.
2. *Initial Project Costs* would average $50 per gross square foot, including planning and design architectual fees, construction, interior finishing and equipment to operate all aspects of plant.
3. *Annual Use Cost* would average 2.5 percent of initial project costs, or $1.25 per gross square

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*Includes departmental conference rooms.

**In addition to the experience of the panelists, source materials used in arriving at these estimates included U.S. Department of Health, Education, and Welfare, Public Health Service, *Medical Education Facilities Guide,* (Washington, D. C., 1964).

TABLE CM-22

Personnel Costs Associated with the Basic and Clinical Sciences Program

Cost category	Number of Personnel	Average annual salary (1973 estimates)	Total costs
Basic sciences program			
Faculty salaries	89	$22,000	$1,958,000
Doctoral stipends	180	3,500	630,000
Clerical salaries	36	7,500	270,000
Technician salaries	73	10,000	730,000
Fringe benefits at 15% of salaries			443,700
Other direct operating costs at at 7% of salaries			207,060
Sub-total - basic sciences			$4,238,760
Clinical sciences program			
Faculty salaries	157	$32,000	$5,024,000
House officer salaries	150	12,600	1,890,000
Clerical salaries	79	7,500	592,500
Technician salaries	79	10,000	790,000
Fringe benefits at 15% of salaries			1,244,475
Other direct operating costs at 7% salaries			580,755
Sub-total - clinical sciences			$10,121,730
Total academic program			$14,360,490

TABLE CM-23

Instructional Space Requirement
(Actual Dollars)

(1) Type of facility	(2) Unit capacity	(3) Square feet/unit	(4) Number of units	(5) Total capacity	(6) Total [illegible] feet and cost
B A S I C S C I E N C E S					
Lecture halls	125	1,250	2	250	2,500
Conference rooms	30	300	3	90	900
Multi-purpose laboratories	16	1,500	14	224	21,000
Gross anatomy laboratories		3,800	1		3,800
Departmental conference rooms	20	350	6	120	2,100
Total net square feet					30,300
Gross square feet @ 150% of net					45,450
Initial cost @ $50.00 per gross square feet					$ 2,272,500
Annual use cost @ 2.5% of initial cost					56,813
Operations and maintenance @ $2.50/ gross square foot					$ 113,625
Total annual cost					$ 170,438
C L I N I C A L S C I E N C E S					
Lecture halls	125	1,250	1	125	1,250
Conference rooms	20	200	10	200	2,000
Departmental conference rooms	20	350	6	120	2,100
Total net square feet					5,350
Gross square feet @ 150% of net					8,025
Initial cost @ $50.00 per gross square foot					$401,250
Annual use cost @ 2.5% of initial cost					10,031
Operations and maintenance @ $2.50/ gross square foot					$ 20,063
Total annual cost					$ 30,094
G E N E R A L P U R P O S E S					
Amphitheatre	500	5,000	1	500	5,000
Total net square feet					5,000
Gross square feet @ 150% of net					7,500
Initial cost @ $50.00 per gross square foot					$375,000
Annual use cost @ 2.5% of initial cost					9,375
Operations and maintenance @ $2.50/ gross square foot					$ 18,750
Total annual cost					$ 28,125

foot. This estimate is based on annual depreciation rates of 7.5 percent for equipment and 2 percent for buildings as suggested by OMB circular A-21. It was assumed that equipment comprises 10 percent of total project costs and space comprises 90 percent of those costs. Thus, (7.5% x .10) + (2% x .90) = 2.5%.

4. *Annual Operating Costs*--utilities, maintenance, and security--would average $2.50 per gross square foot.

Based on these assumptions, and the space requirements presented in Tables CM-23 and CM-24, the total annual costs of instructional space, office space, and research laboratories were estimated at $1,200,207, $647,213 of which could be attributed directly to the basic sciences program, and $524,869 to the clinical sciences program. Table CM-25 presents a summary of these costs.

Estimating the Personnel, Facilities, and Annual Operating Costs Required for Other Administrative and Centralized Support Activities

The administrative workshop estimated the personnel, space and equipment, and other resources necessary for administrative or centralized support services in an institution providing undergraduate medical education. The panel developed its estimates on the assumption that the medical school was a freestanding institution that did not share resources with other schools in a university or health sciences center.

Table CM-26 summarizes the annual operating costs associated with these types of services. A detailed description of each activity included in Table CM-26 is provided in Tables CM-27 through CM-43.

Section D

Allocating Costs of Programs

After determining the costs of all activities that take place in the constructed institution, the administrative workshop developed rules for allocating costs to the programs of M.D. education, doctoral and other education, house officer training, patient care, and research. Section D describes the methods that were used to allocate costs of the basic and clinical sciences, including instructional and faculty office space, and the administrative and centralized support activities.

TABLE CM-24

Faculty and Clerical Office Space and Research Laboratory Requirements
(Actual Dollars)

(1) Type of faculty	(2) Unit capacity	(3) Square feet/unit	(4) Number of units	(5) Total capacity	(6) Total square feet and cost (3) x (4)
BASIC SCIENCES					
Faculty offices	1	120	89	89	10,680
Clerical offices	1	80	36	36	2,880
Research laboratories	1	800	89	89	71,200
Total net square feet					84,760
Gross square feet @ 150% of net					127,140
Initial cost @ $50.00 per gross square foot					$6,357,000
Annual use cost @ 2.5% of initial cost					158,925
Operations and maintenance @ $2.50/ gross square foot					317,850
Total annual cost					$ 476,775
CLINICAL SCIENCES					
Faculty offices	1	120	157	157	18,840
Clerical offices	1	80	79	79	6,320
Research laboratories	1	400	157	157	62,800
Total net square feet					87,960
Gross square feet @ 150% of net					131,940
Initial cost @ $50.00 per gross square foot					$6,579,000
Annual use cost @ 2.5% of initial cost					164,925
Operations and maintenance @ $2.50/ gross square foot					329,850
Total annual cost					$ 494,775

TABLE CM-25

Summary of Total Annual Costs of Space in Basic and Clinical Science Programs

Cost Category	Annual cost
Basic science program	
Instructional space	$ 170,438
Faculty and clerical office space	76,275
Research laboratory space	400,500
Sub-total	$ 647,213
Clinical science program	
Instructional space	$ 30,094
Faculty and clerical office space	141,525
Research laboratory space	353,250
Sub-total	$ 524,869
General purpose space	
Amphitheatre	$ 28,125
Total academic space requirements	$1,200,207

TABLE CM-26

Annual Operating Costs Associated with Administrative and Centralized Support Activities
(Dollars in thousands)

Type of activity	Annual operating costs
Centralized services	$1,431,600
Library facilities	418,325
Educational resources department	108,675
Audio visual sources	210,250
Animal quarters	304,425
Computer operations	389,925
Academic administration	407,268
Dean's office	243,843
Admissions	68,375
Registrar's office	47,525
Financial aid office	47,525
Business management	570,275
Personnel	91,800
Affirmative action	37,100
Business and fiscal	322,250
Public relations	44,925
Grants administration	37,100
Fund-raising	37,100
Financial aid to students	70,944
General support and maintenance	118,125
Total annual operating cost	$2,598,212

TABLE CM-27

Library Facilities

Description:

- Individual study space will be provided by multipurpose labs during first two years of M.D. program
- Library operates on two shifts, 7 days a week

Salaries and expenses		
5 Professionals (1 @ $25,000, 2 @ $16,000, 2 @ $11,000)	79,000	
10 Non-professionals @ $7,500	75,000	
Fringe benefits @ 15% of salaries	23,100	
Other direct operating expenses @ 15% of salaries	23,100	$200,200
Space		
° Stack space for 100,000 volumes	10,000	
° 10 offices @ 120 sq. ft.	1,200	
° 150 user seats @ 50 sq. ft.	7,500	
° Journal room	1,500	
° Audio-visual library room	1,000	
° Work and storage space	2,000	
° Entrance, exhibit, front desk	1,000	
Total net square feet of space	24,200	
Gross square feet of space @ 150% of net	36,300	
Initital cost @ $50.00 per gross square foot	$1,815,000	
Annual use cost @ 2.5% of initial cost	$45,375	
Operations and maintenance @ $2.50/gross square foot	$90,750	136,125
Books		
° Initial cost of 70,000 volumes @ $20	$1,400,000	
° Initial cost of 2,000 journals, 10 years of book issues @ $28/journal (including binding)	$560,000	
° Annual cost of 1,000 new volumes/year	$20,000	
° Annual cost of 2,000 journals/year	$56,000	76,000
Computer rental and use of medlars	$6,000	6,000
Total annual cost		$418,325

TABLE CM-28

Educational Resources Department

Description:

- Educational psychologists who assist faculty in designing programmed learning materials

Salaries and expenses		
3 Professionals @ $20-22,000	$66,000	
2 Clerical @ $7,500	15,000	
Fringe benefits @ 15% of salaries	12,150	
Other direct operating expenses @ 15% of salaries	12,150	$105,300
Space		
Total net square feet of space	600	
Gross square feet of space at 150% of net	900	
Initial cost @ $50.00 per gross square foot	$45,000	
Annual use cost @ 2.5% of initial cost	1,125	
Operations and maintenance @ $2.50/gross square foot	2,250	3,375
Total annual cost		$180,675

TABLE CM-29

Audio-Visual Services

Description:

- Includes medical illustration services, photography studios, projection equipment, and support services for producing self-instructional material and teaching aids
- High costs of supplies, maintenance, and repair of equipment raises other direct from 15% to 25%
- Additional square feet of space required over the 120 square feet per person to accommodate equipment and supplies

Salaries and expenses		
5 Professionals @ $16,000	$ 80,000	
4 Clerical @ $7,500	30,000	
Fringe benefits @ 15% of salaries	16,500	
Other direct operating expenses @ 25% of salaries	27,500	$154,000
Space		
Total net square feet of space	10,000	
Gross square feet of space @ 150% of net	15,000	
Initial cost @ $50.00 per gross square foot	$750,000	
Annual use cost @ 2.5% of initial cost	18,750	
Operation and maintenance @ $2.50/gross square foot	37,500	56,250
Total annual cost		$210,250

TABLE CM-30

Animal Quarters

Description:

- Animal farm is equivalent in size to 5,000 net interior square feet of space

Salaries and expenses		
2 DVM's @ $24,000	$ 48,000	
12 Non-professionals @ $6,500	78,000	
Fringe benefits @ 15% of salaries	18,900	
Other direct operating expenses @ 15% of salaries	18,900	$163,800
Space		
Quarters	15,000	
Holding space	5,000	
Farm	5,000	
Total net square feet of space	25,000	
Gross square feet of space @ 150% of net	37,500	
Initial cost @ $50.00 per gross square foot	$1,875,000	
Annual use cost @ 2.5% of initial cost	46,875	
Operations and maintenance @ $2.50/gross square foot	93,750	
Animal costs		140,625
Total annual cost		$304,425

TABLE CM-31

Computer Operations

Description:

- IBM 370 computer with 10 terminals and associated equipment--requires some additional net square feet of space
- Serves academic, research, and business purposes, but not the teaching hospital
- Higher costs of supplies, maintenance, and repair of equipment raises other direct from 15 percent to 20 percent

Salaries and expenses		
4 Computer operators @ $7,000	$ 28,000	
4 Systems designers and programmers for business purpose @ average of $17,500	70,000	
4 Systems designers and programmers for academic purposes @ average of $17,500	70,000	
Fringe benefits @ 15% of salaries	25,200	
Other direct operating expenses @ 20% of salaries	33,600	$226,800
Space		
Total net square feet of space	5,000	
Gross square feet of space @ 150% of net	7,500	
Initial cost @ $50.00 per gross square foot	$375,000	
Annual use cost @ 2.5% of initial cost	9,375	
Operations and maintenance @ $2.50/gross square foot	18,750	28,125
Equipment rental		135,000
Total annual cost		$389,925

TABLE CM-32

Dean's Office

Salaries and expenses		
Dean @ $50,000	$ 50,000	
Associate Dean @ $40,000	40,000	
2 FTE Assistant Deans (of four) @ $30,000	60,000	
4 Clerical @ $7,500	30,000	
Fringe benefits @ 15% of salaries	27,000	
Other direct operating expenses @ 15% of salaries	27,000	$234,000
Space		
Eight offices @ 150 square feet	1,200	
Dean's conference room	500	
Total net square feet of space	1,750	
Gross square feet of space @ 150% of net	2,625	
Initial cost @ $50.00 per square foot	131,250	
Annual use cost @ 2.5% of initial cost	3,281	
Operations and maintenance @ $2.50/gross square foot	6,562	9,843
Total annual cost		$243,843

TABLE CM-33

Addissions Office

Salaries and expenses		
1 Professional @ $20,000	$ 20,000	
4 Clerical @ $7,500	30,000	
Fringe benefits @ 15% of salaries	7,500	
Other Direct operating expenses @ 15% of salaries	7,500	$ 65,000
Space		
Total net square feet of space	600	
Gross square feet of space @ 150% of net	900	
Initial cost @ $50.00 per square foot	$ 45,000	
Annual use cost @ 2.5% of initial cost	1,125	
Operations and maintenance @ $2.50/gross square foot	2,250	3,375
Total annual cost		$ 68,375

TABLE CM-34

Registrar's Office

Salaries and expenses		
1 Professional @ $20,000	$ 20,000	
2 Clerical @ $7,500	15,000	
Fringe benefits @ 15% of salaries	5,250	
Other direct operating expenses @ 15% of salaries	5,250	$ 45,500
Space		
Total net square feet of space	360	
Gross square feet of space @ 150% of net	540	
Initial cost @ $50.00 per square foot	$ 27,000	
Annual use cost @ 2.5% of initial cost	675	
Operations and maintenance @ $2.50/gross square foot	1,350	2,025
Total annual cost		$ 47,525

TABLE CM-35

Financial Aid Office

Salaries and expenses		
1 Professional @ $20,000	$ 20,000	
2 Clerical @ $7,500	15,000	
Fringe benefits @ 15% of salaries	5,250	
Other direct operating expenses @ 15% of salaries	5,250	$ 45,500
Space		
Total net square feet of space	360	
Gross square feet of space @ 150% of net	540	
Initial cost @ $50.00 per square foot	27,000	
Annual use cost @ 2.5% of initial cost	675	
Operations and maintenance @ $2.50/gross square foot	1,350	2,025
Total annual cost		$ 47,525

TABLE CM-36

Personnel

Description:

- Office that handles administrative aspects of personnel but does not initiate faculty hiring; requires one personnel employee for every 100 employees of the institution

Salaries and expenses

3 Professionals @ $15,000	$ 45,000	
3 Clerical @ $7,500	22,500	
Fringe benefits @ 15% of salaries	10,125	
Other direct operating expenses @ 15% of salaries	10,125	$ 87,750

Space

Total net square feet of space	720	
Gross square feet of space @ 150% of net	1,080	
Initial cost @ $50.00 per square foot	$ 54,000	
Annual use cost @ 2.5% of initial cost	1,350	
Operations and maintenance @ $2.50/gross square foot	2,700	4,050
Total annual cost		$ 91,800

TABLE CM-37

Affirmative Action

Description:

- Activities directed toward the recruitment of women, racial and ethnic minorities

Salaries and expenses

1 Professional @ $20,000	$ 20,000	
1 Clerical @ $7,500	7,500	
Fringe benefits @ 15% of salaries	4,125	
Other direct operating expenses @ 15% of salaries	4,125	$ 35,750

Space

Total net square feet of space	240	
Gross square feet of space @ 150% of net	360	
Initial cost @ $50.00 per square foot	$ 18,000	
Annual use cost @ 2.5% of inital cost	450	
Operations and maintenance @ $2.50/gross square foot	900	1,350
Total annual cost		$ 37,100

TABLE CM-38

Business and Fiscal Services

Description:

- Includes budget preparation and administration, accounting, purchasing, and payroll

Salaries and expenses		
1 Professional @ $30,000	$ 30,000	
4 Professionals @ $20,000	80,000	
15 Clerical @ $8,500	127,500	
Fringe benefits @ 15% of salaries	35,625	
Other direct operating expenses @ 15% of salaries	35,625	$308,750
Space		
Total net square feet of space	2,400	
Gross square feet of space @ 150% of net	3,600	
Initial cost @ $50.00 per square foot	$180,000	
Annual use cost @ 2.5% of initial cost	4,500	
Operations and maintenance @ $2.50/gross square foot	9,000	13,500
Total annual cost		$322,250

TABLE CM-39

Public Relations and Publications

Description:

- Includes catalogues, bulletins, and announcements directly related to the operation of the institution

Salaries and benefits		
1 Professional @ $18,000	$ 18,000	
2 Clerical @ $7,500	15,000	
Fringe benefits @ 15% of salaries	4,950	
Other direct operating expenses @ 15% of salaries	4,950	$ 42,900
Space		
Total net square feet of space	360	
Gross square feet of space @ 150% of net	540	
Initial cost @ $50.00 per square foot	$ 27,000	
Annual use cost @ 2.5% of initial cost	675	
Operations and maintenance @ $2.50/gross square foot	1,350	2,025
Total annual cost		$ 44,925

TABLE CM-40

Grants (Sponsored Program) Administration

Salaries and benefits		
1 Professional @ $20,000	$ 20,000	
1 Clerical @ $7,500	7,500	
Fringe benefits @ 15% of salaries	4,125	
Other direct operating expenses @ 15% of salaries	4,125	$35,750
Space		
Total net square feet of space	240	
Gross square feet of space @ 150% on net	360	
Initial cost @ $50.00 per square foot	$ 18,000	
Annual use cost @ 2.5% of initial cost	450	
Operations and maintenance @ $2.50/gross square foot	900	1,350
Total annual cost		$37,100

TABLE CM-41

Fund Raising

Salaries and benefits		
1 Professional @ $20,000	$ 20,000	
1 Clerical @ $7,500	7,500	
Fringe benefits @ 15% of salaries	4,125	
Other direct operating expenses @ 15% of salaries	4,125	$ 35,750
Space		
Total net square feet of space	240	
Gross square feet of space @ 150% of net	360	
Initial cost @ $50.00 per suqare foot	$ 18,000	
Annual use cost @ 2.5% of initial cost	450	
Operations and maintenance @ $2.50/gross square foot	900	1,350
Total annual cost		$ 37,100

TABLE CM-42

Financial Aid to Students

Description	
- 70 percent, or 280 M.D. students to receive loans averaging $1,364	$381,920
- 46 percent, or 184 M.D. students to receive scholarships averaging $1,178	216,752
Sub-total	
Minus:	598,672
- 90% of loans from other sources	($343,728)
- 184 Federal stipends @ $1,000	($184,000)
Total financial aid requirements to be supported by medical school budget	$ 70,944

TABLE CM-43

General Support and Maintenance Activities

Description

- Includes space for power plant, central telephone switchboard, post office, student health facility, repair shops, garages, central xeroxing, locker room, and lounges
- Space, not personnel, is delineated here. Personnel are included in the $2.50 annual cost of operating the institution

Space

Total net square feet of space	21,000	
Gross square feet of space @ 150% of net	31,500	
Initial cost @ $50.00 per square foot	$1,575,000	
Annual use cost @ 2.5% of initial cost	39,375	
Operations and maintenance @ $2.50/gross square foot	78,750	
Total annual cost		$118,125

Allocating the Costs of the Basic Sciences Program

Table CM-9 presented the distribution of time for the 89.0 FTE faculty members in the multi-purpose institution designed by the basic sciences workshop. Service, professional development and writing activities account for 15 percent or 13.4 of these FTE's. These "overhead" activities evolve from and support the faculty member's primary missions of education and research, and they could be allocated to these missions without distorting the general distribution of faculty time within the institution. When the 13.4 FTE's are allocated proportionately to the other activities, the resulting distribution of the 89.0 FTE's is as follows:

Activity	$MP = I_M + I_O + R$
Percent distribution of time	100% = 23% + 18% + 59%
FTE faculty required	89.0 = 20.9 + 15.7 + 52.4

Based on this distribution of faculty time, the costs of basic science personnel were allocated to the three programs of M.D. education, doctoral and other instruction, and research.

As discussed earlier in Chapter 3, joint activities in the Basic Sciences program result from the overlaps between research and M.D. education, research and graduate education, and M.D. education and graduate education. Since there is no obvious way to allocate the cost of faculty time that contributes to more than one program, the decision was made to distribute joint costs in proportion to the total size of the various programs benefitting from them. For example, since the number of FTE's needed for the M.D. education program is 39.6,* and the number needed for the doctoral/other education program is 31.4,** then the costs of the joint M.D./doctoral education activities would be divided between the two programs, respectively, according to the ratios 39.6/71.0 and 31.4/71.0.

Figure CM-1 describes the direction in which joint faculty activities were allocated in the basic sciences based on this proportional distribution system and Table CM-44 presents the actual program allocations. Allocating joint activities produces the following percentage distribution of faculty FTE's, by program:

M.D. education	33.1% or 29.5 FTE's
Other education	21.3% or 19.0 FTE's
Research	45.6% or 40.5 FTE's

---

*The FTE's for M.D. education were computed at 39.6 in the discussion on the Basic Sciences Faculty Size. The 39.6 FTE's include 20.9 FTE's for instruction of M.D. students, 4.7 FTE's for joint M.D./Other instruction, and 14.0 FTE's for research considered essential to M.D. education.

**The FTE's for other education were computed at 31.4. This includes 15.7 FTE's for instruction of other students and 15.7 FTE's for research essential to the other education programs.

FIGURES CM-1

Distribution of Costs of Activities to Programs in the Basic Sciences

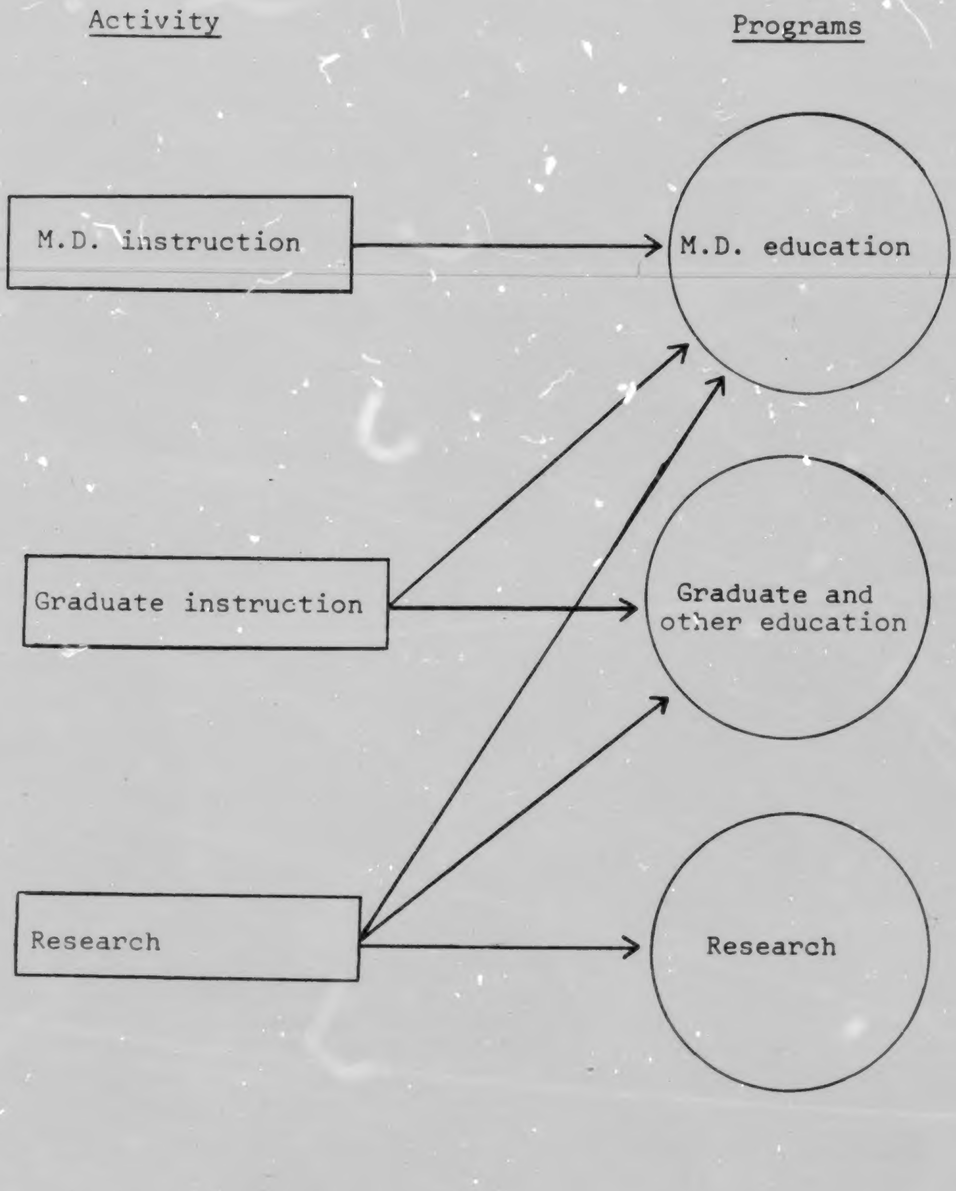
Activity
Programs
M.D. instruction
M.D. education
Graduate instruction
Graduate and other education
Research
Research

TABLE CM-44

Distribution of Basic Science Faculty Activities to Programs

Activity	Number of FTE's	Program distribution M.D. education	 Graduate/ other education	 Research
M.D. instruction	20.9	20.9	-	-
Graduate instruction	15.7	2.6	13.1	-
Research	52.4	6.0	5.9	40.5
Total	89.0	29.5	19.0	40.5
Percentage distribution	100%	33.1%	21.3	45.6

The total costs of clerical personnel were then allocated to the three programs on the same basis as faculty costs. Technical personnel were allocated to programs on the following basis:

- the 20 technical personnel associated with M.D. education were distributed to I_M, joint M.D./graduate instruction, and R_M according to their share of total FTE's in E_M
- the technical personnel associated with I_M, I_O and R_R were indirectly allocated to E_M, E_O and R, respectively
- the technical personnel associated with the joint activities, R_M, R_O and joint M.D./graduate instruction were distributed to the programs benefitting from them in proportion to their total size.

Table CM-45 displays the allocation of the costs of the basic science program to the three programs of M.D. education, graduate and other education, and research.

Allocating the Costs of the Clinical Sciences Program

Table CM-46 presents the distribution of the faculty required, by activity, for the program developed by the clinical sciences workshop, with the 15 percent of faculty time spent of professional development and community service, in the 60-hour week, allocated equally to instruction, research and patient care. The resulting percentages reflect the proportion of time spent by the total clinical faculty in these activities plus administration, based on the 60 hour week described in Table CM-19.

In clinical sciences, the joint activities to be allocated to the four programs of M.D. education, house officer education, patient care, and research, are (1) research essential to the education program, and (2) administration of the education program. All patient care was allocated to the patient care program in recognition of the fact that this patient care takes place to provide the patient population needed for teaching purposes.

Table CM-47 presents the distribution of faculty to programs.

Allocating joint activities produces the following percentage distribution of faculty FTE's, by program:

M.D. education	25.2%
House officer education	23.9%
Research	20.9%
Patient care	30.0%

M.D. education comprises approximately 25 percent of total faculty costs for the clinical sciences program, slightly more than the 24 percent allocated to house officer education. The largest amount of faculty time, 30 percent, is spent in patient care.

TABLE CM-45

Distribution of Basic Science Salaries and Expenses to Programs

Cost categories	Total costs	Program distribution		
		M.D. education	Graduate and other education	Research
Faculty salaries a/	$1,958,000	$ 648,098	$ 417,054	$ 892,848
Doctoral stipends	630,000	-	630,000	-
Clerical salaries a/	270,000	89,370	57,510	123,120
Technical salaries b/	730,000	160,600	94,900	474,500
Fringe benefits c/	443,700	134,441	85,634	223,625
Other direct c/ expenses	207,060	62,739	39,963	104,358
Total	$4,238,760	$1,095,248	$1,325,061	$1,819,451

a/Distributed as follows: M.D. education, 33.1%; graduate education, 21.3%; research, 45.6%.
b/Distributed as follows: M.D. education, 22%; graduate education, 13%; research, 65%.
c/Distributed in the same proportion as total salaries, encluding doctoral stipends.

TABLE CM-46

Distribution of Clinical Science Faculty Time, by Activity

Activity	MP	=	I	+	R	+	PC	+	A_E
Percent distribution of time	100%	=	27%	+	36%	+	30%	+	7%

TABLE CM-47

Percentage Distribtuion of Clinical Science Faculty Activities to Programs

Activity	Percentage distribution	Program distribution (in percents)			
		M.D. education	House officer education	Research	Patient care
Instruction	27.0%	18.0	9.0	-	-
Research	36.0%	3.7	11.4	20.9	-
Patient care	30.0%	-	-	-	30.0
Administration related to education	7.0	3.5	3.5	-	-
Total	100.0	25.2	23.9	20.9	30.0

was allocated to patient care.

Table CM-48 displays the allocation of the costs of the clinical sciences program to the four programs of M.D. education, house officer education, research, and patient care.

Allocating Annual Operating Costs Associated with Space Requirements for the Academic Program

The instructional, laboratory, and office space associated with the academic program in basic and clinical sciences was allocated to the five programs of the constructed cost model according to a series of allocation rules developed by the administrative workshop. These rules and the categories to which they apply, are summarized in Table CM-49. Table CM-50 displays the allocation of the operating costs of these space requirements.

Allocating the Costs of the Administrative and Centralized Support Activities

The costs of the administrative and centralized support activities were also allocated to the five programs of the constructed costs model according to allocation rules developed by the Administrative Workshop. Table CM-51 presents these rules, and the categories to which they apply. Table CM-52 presents the results of these allocations.

Summary Distribution of Constructed Costs to Programs

When the costs of the academic, administrative and centralized activities are added together, the total cost of the M.D. program in the constructed model equals $4,697,580. When this number is divided by 400 M.D. students, the per student cost is $11,744. Table CM-52 summarizes these calculations.

TABLE CM-48

Distribution of Clinical Sciences Salaries and Expenses to Programs

Cost categories	Total costs	Program distribution			
		M.D. education	House officer education	Research	Patient care
Faculty salaries a/	$5,024,000	$1,266,048	$1,200,736	$1,050,016	$1,507,200
House officer salaries	1,890,000	189,000	-	-	1,701,000
Clerical salaries a/	592,500	149,310	141,608	123,832	177,750
Technical salaries b/	790,000	82,160	248,850	458,990	-
Fringe benefits a/	1,244,475	313,608	297,430	260,095	378,342
Other direct operating expenses a/	580,755	146,350	138,800	121,378	174,227
Total	$10,121,730	$2,146,476	$2,027,424	$2,014,311	$3,933,519

a/Distributed as follows: M.D. education 25.2%; house officer education, 23.9%; research 20.9%; patient care, 30%.

b/Distributed as follows: 58.1% to research; 10.4% to M.D. education; and 31.5% to house officer education.

TABLE CM-49

Rules for Allocating Academic Space Requirements

Allocation formula	Categories covered	Description of formula	Percentage distributed to each program				
			M.D. education	Graduate education	House officer education	Research	Patient care
1	Basic sciences instructional space, clinical sciences instructional space, amphitheatre	All costs to M.D. education	100	-	-	-	-
2	Basic sciences office space	Distribution based on allocation of time of basic science faculty	33.1	21.3	-	45.6	-
3	Research laboratory space	Distribution to M.D., and research programs based on ratio of FTE's in research essential to M.D. education divided by total FTE's in research	11.5(BS) 10.4(CS)		- -	88.5(BS) 89.6(CS)	- -
4	Clinical sciences office space	Distribution based on allocation of time of clinical sciences faculty	25.2	-	23.9	20.9	30.0

TABLE CM-50

Distribution of the Costs of Academic Space Requirements to Programs

Type of space	Total annual operating costs	Distribution to programs				
		M.D. education	Graduate education	House officer education	Research	Patient care
Basic science program						
Instructional space	$ 170,438	$170,438	$ -	$ -	$ -	$ -
Offices	76,275	25,247	16,247	-	34,781	-
Research labs	400,500	46,057	-	-	354,443	-
Sub-total	647,213	241,742	16,247	-	389,224	-
Clinical sciences program						
Instructional space	30,094	30,094	-	-	-	-
Offices	141,525	35,664	-	33,824	29,579	42,458
Research labs	353,250	36,738	-	-	316,512	-
Sub-total	524,869	102,496	-	33,824	346,091	42,458
Amphitheatre	28,125	28,125	-	-	-	-
Total costs	$1,200,207	$372,363	$16,247	$33,824	$735,315	$42,458

TABLE CM-51

Rules for Allocating Administrative and Centralized Support Activities

Allocation formula	Categories covered	Description of formula	Percentage distributed to each program				
			M.D. education	Graduate education	House officer education	Research	Patient care
1	Financial aid to students	All costs to M.D. education	100	-	-	-	-
5	Library	Distribution first weighted by use: M.D. student = 1, graduate student = 2, house officers = 0.5, faculty = 2. Faculty costs then distributed to programs based on weighted average of distribution of basic and clinical sciences' faculty time in each program	41.9	27.8	11.6	11.4	7.3
6	Educational resources department Audio visual services	Distribution first weighted by use: M.D. students = 1, graduate students = 0.5, faculty = 0.25. Faculty costs then distributed to programs based on weighted average of distribution of basic and clinical sciences faculty time each program	77.0	15.7	1.7	3.4	2.2
7	Animal Quarters	Eighty percent of costs to research program, 20 percent to M.D. education	80.0	-	-	20.0	-
8	Computer operations, business management, general maintenance	Weighted average of distribution of basic and clinical sciences faculty time spent in each programs	28.1	7.7	15.2	29.8	19.2
9	Academic administration	Distribution based on number of students	56.0	23.0	21.0	-	-

TABLE CM-52

Distribution of the Costs of Administrative and Centralized
Support Activities to Programs

Type of activity	Total annual operating costs	Distribution to programs				
		M.D. education	Grauuate education	House officer education	Research	Patient care
Centralized services	$1,431,600	$ 591,039	$196,494	$113,348	$418,192	$112,527
Library	418,325	175,002	116,469	48,553	47,620	30,681
Educational resources department	108,675	83,683	17,038	1,883	3,692	2,379
Audio visual services	210,250	161,900	32,963	3,643	7,142	4,602
Animal quarters	304,425	60,885	-	-	243,540	-
Computer operations	389,925	109,569	30,024	59,269	116,198	74,865
Academic administration	407,268	228,070	93,672	85,526	-	-
Business management	570,275	160,247	43,911	86,682	169,942	109,493
Financial aid to students	70,944	70,944	-	-	-	-
General support and maintenance	118,125	33,193	9,096	17,955	35,201	22,680
Total annual operating costs	$2,598,212	$1,083,493	$343,173	$303,511	$623,335	$244,700

TABLE CM-53

Summary Distribution of Constructed Costs in Medicine to Programs

Cost category	Total annual operating costs	Distribution to programs				
		M.D. education	Graduate education	House officer education	Research	Patient care
Basic sciences program						
Salaries and expenses	$ 4,238,760	$1,095,248	$1,325,061	$ -	$1,818,451	$ -
Annual operating costs of space	647,213	241,742	16,247	-	389,224	-
Sub-total	4,885,973	1,336,990	1,341,308	0	2,207,675	0
Clinical sciences program						
Salaries and expenses	10,121,730	2,146,476	-	2,027,424	2,014,311	3,933,519
Annual operating costs of space	524,869	102,496	-	33,823	346,091	42,458
Sub-total	10,646,599	2,248,972	0	2,061,247	2,360,402	3,975,977
Amphitheatre	28,125	28,125	-	-	-	-
Administration and support	2,598,212	1,083,493	343,173	303,511	623,335	244,700
Total	$18,158,909	$4,697,580	$1,684,481	$2,364,758	$5,191,412	$4,220,677
Cost per M.D. student		11,744				

Attachment 3 to Chapter 2

DELIBERATIONS OF THE CONSTRUCTED COSTS SEMINAR IN DENTISTRY

The constructed costs model in dentistry was designed by nineteen dental educators during a one and one-half day seminar in September, 1973. While the seminar participants were guided by what the medicine panelists had learned, the dentists brought a slightly different perspective to the modeling process. The dental panelists determined that the level of resources in most dental schools was inadequate to provide a good dental education. Therefore, the dental model they designed represents their judgment on what a dental school *should be* to provide adequate education for the modern dentist, rather than a replication of the level of resources currently found in most dental schools.

The major differences between the constructed costs model and most existing dental schools are summarized below:

1. The constructed model was designed with the majority of faculty employed full-time, while the heavy reliance of most dental schools is on part-time and volunteer clinical faculty.

2. The model defines a support staff that is larger than the size maintained in most existing schools.

3. The model assumes that modern concepts of auxiliary utilization are being taught in the clinic with certified allied dental personnel; most dental schools are unable to pay for certified personnel and are therefore forced to utilize allied dental students instead.

4. The constructed model requires a level of research activity essential for dental education, which exceeds the level in most schools today.

5. The model provides intramural practice facilities and time for all full-time faculty and makes *all the direct costs* associated with that practice recoverable through patient care income; many institutions do not provide intramural facilities for their faculty and where they do, all the direct costs are usually borne by the institution.

6. The model assumes a self-contained faculty; in many institutions much of the basic science curriculum is provided on a reimbursable basis by the medical school at a lower cost per student than the self-contained alternative.

7. The number of graduate students in the clinical program is greater than that found in most dental schools.

Although the panelists did not attempt to quantify the additional costs associated with these requirements, there was consensus that the effect would be to substantially increase costs over those in existing institutions.

This attachment presents the results of the constructed costs seminar in dentistry. Section A describes the deliberations of the basic sciences workshop, Section B the clinical sciences workshop, and Section C the administrative workshop. The total costs of the constructed institution and the distribution of total costs to the D.D.S. program are provided in Section D.

Section A

Basic Sciences Workshop in Dentistry

Defining a Curriculum

Length of Time and Subject Areas. The basic science curriculum is based on 1,250 hours of direct faculty contact in basic science instruction for a class size of 100 dental students. It was assumed that students would spend the largest portion of their time in oral biology, a subject area that relates the basic sciences to clinical activities. Distribution of the hours of instruction among all subject areas included in the basic science curriculum is shown in Table CD-1.

Modes of Instruction for Basic Sciences. Six modes of instruction were defined for each subject area: lecture, laboratory, demonstration/conference, tutorial, self-instruction, and examination.

Table CD-2 summarizes the number of sections into which a class of 100 students should be divided and the faculty/student ratio required per section for each mode of instruction.

TABLE CD-1

Distribution of Basic Science Hours of Instruction by Subject Area

Subject area	Hours of instruction	
	Number	Percent
Total	1,250	100%
Anatomy [a]	293	23
Biochemistry	120	10
Microbiology	164	13
Oral biology [b]	330	26
Pathology	144	12
Pharmacology	99	8
Physiology	100	8

a/The definition of anatomy includes gross and microscopic anatomy, and neuroanatomy.

b/The definition of oral biology includes clinical pharmacology, nutrition, oral pathology, oral histology, oral physiology, growth and development, materials, statistics, and epidemiology.

TABLE CD-2

Summary of Characteristics of Basic Science Program by Mode of Instruction

Mode of instruction	Weighted percentage distribution of student time	Number of sections per 100 students	Faculty/student ratio per section
Lecture	45%	1	1 to 100
Laboratory	33	4	1 to 25
Demonstration/ conference	11	4	1 to 25
Tutorial	2	100	1 to 1 a/
Self-instruction	7	1	1 to 100
Examinations	2	1	1 to 100

---

a/In anatomy, the ratio for tutorial was set at 1 faculty member to 10 students.

Faculty/Student Contact Hours. A total of 4,076 faculty/student contact hours was determined by multiplying the hours of instruction per week in each mode for each subject area by the number of sections per mode for 100 students. Table CD-3 shows the results of this calculation.

FTE Faculty Requirements for Instruction

The panelists first, determined the amount of faculty time spent in preparation and evaluation activities related to instruction. Table CD-4 presents the number of hours considered necessary for preparation and evaluation per direct contact hour.

Second, the panelists decided to use an average work year of 2,000 hours--40 hours a week for 50 weeks. Table CD-5 displays the computation of the number of FTE basic science faculty for dental student instruction in each subject area.

FTE Faculty Requirements for Education

The Education Model. In addition to faculty time needed for D.D.S. instruction, the panelists agreed that basic scientists must spend time on other activities--particularly research and instruction of graduate students--to provide a complete program of undergraduate dental education. The panelists' first approach to determining how much faculty time should be devoted to these activities was to develop a model of a dental school where D.D.S. education was the primary program. In this model, activities that contribute to research or graduate education are included only to the extent that they are essential to the production of D.D.S. graudates; no independent research or graduate education is carried on for its own sake.

The following assumptions were used to translate the 7.1 FTE faculty needed for D.D.S. instruction--hereafter represented by the symbol I_D--to an FTE faculty for D.D.S. education, E_D:

- a faculty member must spend 30 percent of his time in research activities to maintain his competence as an instructor of dental students. This variable is represented as R_D
- a graduate education program (M.S., Ph.D.) is necessary to assure high quality faculty for an undergraduate dental education program. Faculty time spent on the instruction of graduate and allied health students in the presence of dental students is estimated as 10 percent of total FTE faculty time for D.D.S. education. This variable is represented as I_{DO}

TABLE CD-3

Faculty/Student Contact Hours by Subject Area and Mode of Instruction

Subject area by mode	Hours of instruction	Number of sections per 100 students	Facutly-student contact hours (hours x sections)
Total hours in all subject areas	1,250		4,076
Anatomy			
Lecture	105	1	105
Laboratory	150	4	600
Demonstration/ conference	0	4	0
Tutorial	10	10	100
Self-instruction	25	1	25
Examinations	3	1	3
Total	293		833
Biochemistry			
Lecture	64	1	64
Laboratory	0	4	0
Demonstration/ conference	48	4	192
Tutorial	5	100	500
Self-instruction	0	1	0
Examinations	3	1	3
Total	120		759
Microbiology			
Lecture	60	1	60
Laboratory	101	4	404
Demonstration/ conference	0	4	0
Tutorial	0	100	0
Self-instruction	0	1	0
Examinations	3	1	3
Total	164		467
Oral Biology			
Lecture	189	1	189
Laboratory	115	4	460
Demonstration/ conference	0	4	0
Tutorial	3	100	300
Self-instruction	20	1	20
Examinations	3	1	3
Total	330		972
Pathology			
Lecture	60	1	50
Laboratory	40	4	160
Demonstration/ conference	25	4	100
Tutorial	1	100	100
Self-instruction	25	1	25
Examinations	3	1	3
Total	144		438
Pharmacology			
Lecture	40	1	40
Laboratory	0	4	0
Demonstration/ conference	30	4	120
Tutorial	1	100	100
Self-instruction	25	1	25
Examinations	3	1	3
Total	99		288
Physiology			
Lecture	56	1	56
Laboratory	0	4	0
Demonstration/ conference	40	4	160
Tutorial	1	100	100
Self-instruction	0	1	0
Examinations	3	1	3
Total	100		319

TABLE CD-4

Preparation and Evaluation Time Per Direct Contact Hour by Mode of Instruction

Mode of instruction	Preparation and evaluation hours	
	Per direct contact hour	Total
Total	--	9,785
Lecture	3.0	1,692
Laboratory	3.0	4,872
Demonstration/ conference	3.0	1,716
Tutorial	1.0	1,200
Self-instruction	1.0	95
Examination	10.0	210

TABLE CD-5

Distribution of FTE Faculty Needed for D.D.S. Instruction by Subject Area

Subject area	Total hours needed for instruction a/	FTE faculty for instruction b/
Anatomy	3,103	1.6
Biochemistry	2,057	1.1
Microbiology	1,889	0.9
Oral Biology	3,269	1.6
Pathology	1,523	0.8
Pharmacology	923	0.5
Physiology	1,097	0.6
Total	13,861	7.1

a/Total direct contact hours plus preparation and evaluation hours.
b/Total hours needed for instruction in each subject area divided by 2,000 hours, and rounded to the nearest tenth of an FTE.

- a faculty member should spend 15 percent of his time in public service activities (S), professional development (D), and writing (W). The combination of these activities is represented by the symbol SDW_D.

As shown in Table CD-6, the 7.1 FTE basic science faculty represents 45 percent of total FTE's for instructing dental students. The total faculty requirement is computed by dividing the 7.1 instructional FTE's by 0.45, giving 15.7 FTE basic science faculty for education in a single-purpose institution. The distribution of these FTE's to activities is displayed in Table CD-6.

Having determined the FTE faculty necessary for dental education, the panelists were asked whether these 15.7 FTE's provided adequate faculty size to:

- cover the variety of courses offered in each subject area
- cover scheduling problems
- provide a critical intellectual mass of faculty within each discipline.

The panelists re-evaluated FTE faculty judgments in light of these criteria and adjusted actual faculty size to accomodate dental education in both a freestanding institution and a health science center. The panelists assumed that a slightly smaller size faculty would be required for a health science center because some subspecialties can be provided through faculty members in other health professional schools. Table CD-7 compares the number of FTE faculty with the number of actual faculty by subject area in both types of institutions.

Although 23 faculty are adequate to carry on education in the freestanding school, only 15.7 FTE's or 68 percent of the total faculty time available is absorbed in activities directly related to the D.D.S. education program. The remaining 32 percent of the time available to these faculty members can be directed toward graduate education and independent research. The distribution of faculty time based on a faculty size of 23 is shown in Table CD-8. The differences between the distribution of time in Tables CD-6 and CD-8 is due to the presence of additional faculty resources. Since the education model was not designed to take advantage of this additional time, the panelists developed a model of a multi-purpose institution.

The Multi-Purpose Institution. Recognizing that the education model is neither a reasonable representation of reality nor a complete model for the purposes of cost determination, the panelists developed a model of a complete dental school with independent programs in research and graduate education. Although these activities in the multi-purpose institution could result in independent outputs, the constraints of the constructed costs process limited the size of these activities to a level consistent with an institution whose primary focus remained D.D.S. education. Thus, no resources were

TABLE CD-6

Distribution of FTE faculty Required for Dental Education, by Activity

Activity	E_D	=	I_D	+	I_{DO}	+	R_D	+	SDW_D
Percent distribution of time	100%	=	45%	+	10%	+	30%	+	15%
FTE faculty required	15.7	=	7.1	+	1.6	+	4.7	+	2.3

TABLE CD-7

Comparison of FTE with Actual Faculty Needed for D.D.S. Education in a Freestanding School and a Health Science Center

Subject area	FTE faculty	Actual faculty	
		Freestanding school	Health science center
Anatomy		4	3
Biochemistry		3	3
Microbiology		3	2
Oral Biology		6	6
Pathology		3	3
Pharmacology		2	1
Physiology		2	2
Total	15.7 a/	23	20

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a/The panelists did not distribute these FTE's to subject areas.

TABLE CD-8

FTE Faculty Required for Dental Education in a Freestanding Institution

Activity	E_D	=	I_D	+	I_{DO}	+	R_D	+	SDW_D	+	Additional time
Percent distribution	100%	=	31%	+	7%	+	21%	+	10%	+	31%
FTE faculty required	23	=	7.1	+	1.6	+	4.8	+	2.3	+	7.2

estimated for large scale research efforts or graduate education programs.

The faculty size needed to carry out the programs of dental education, other education, and research in a health science center environment, MP, is derived from the following assumptions:

- the number of FTE's needed to carry out the D.D.S. instruction program, I_D, remains at 7.1
- ten percent of basic science faculty time should be directed towards graduate and allied health instruction I_O, including joint instruction of D.D.S. and other students, I_{DO}
- fifty percent of total basic science faculty time should be devoted to research activities (R) in order to produce a viable, independent research program. Included in the 50 percent would be research essential to D.D.S. education (R_D), research essential to graduate and allied health education (R_O)*, and independent research (R_R) conducted in response to national research priorities. Included in all three of these activities is time for the administration of research activities.
- as in the single product institution, a faculty member should spend approximately 15 percent of his time in public service activities, professional development, and writing (SDW)

Table CD-9 shows the distribution of time and FTE faculty in the multi-purpose institution.

Graduate Student Program

The basic science panelists indicated that in a multi-purpose institution a minimum of one graduate student for every three basic science faculty was required. This results in a graduate student body of approximately 10.

Non-Faculty Support Personnel

The panelists concluded that one clerical person was needed for every three faculty members and that one technician was needed for every two faculty members, plus one additional technician per subject area. With a faculty size of 28 in a multi-purpose institution, this results in a clerical staff of approximately 10 and a technical staff of 22.

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*The panelists estimated that faculty time spent in research essential to graduate education should be equal to faculty time spent in direct instruction of graduate students.

TABLE CD-9

Distribution of Faculty Required in a Multi-purpose Institution

Activity	MP	=	I_D	+	I_O	+	R	+	SDW
Percent distribution of time	100%	=	25.8%	+	10.0%	+	50.0%	+	14.2%
FTE faculty required	27.5	=	7.1	+	2.7	+	13.8	+	3.9

Summary

The basic sciences workshop in dentistry developed a 1,250 hour curriculum for a class of 100 dental students. They distributed that time among broad subject areas and defined six modes on instruction that were applied differentially to each subject area.

As a result of these judgments, 4,076 direct contact hours between faculty and students were calculated as necessary for the instruction of D.D.S. students. When preparation and evaluation time was determined, the total hours needed for instruction increased to 13,861. Based on a work year of 2,000 hours, 7.1 FTE's are needed for D.D.S. instruction.

In an education model where faculty spend time in other activities--namely research and graduate education--only to the extent that those activities are essential to D.D.S. education, the number of basic science FTE's increases to 15.7. However, those FTE's do not take account of "critical mass" and other needs that must be met to have a functioning institution. When the FTE's were re-evaluated with regard to these considerations, the number of faculty increased to 23 in a freestanding school and 20 in a school located in a health science center.

A model of a multi-purpose institution in which independent research and graduate education programs exist along with dental education utilized that additional faculty time and is a reasonable representation of an actual, freestanding dental school. This institution requires 28 FTE faculty, 10 clerical personnel, and 22 technicians.

Section B

Clinical Sciences Workshop in Dentistry

Defining the Curriculum

Length of Time and Clinical Experiences: The clinical curriculum is based on 3,750 hours of clinical experience for each class of 100 dental students. It consists of 1,250 hours of pre-clinical instruction--courses in which technical skills are developed for use in the clinical setting--and 2,500 hours of clinical practice. The panel did not define a specific curriculum.

Modes of Instruction for Clinical Experiences: Four modes of instruction were defined for each pre-clinical area: lecture, laboratory, seminar, and self-instruction.

The only mode of instruction specified for the clinic setting is supervised patient care: Students learn by providing care to outpatients.

Table CD-10 summarizes the number of sections into which a class of 100 students should be divided and the faculty to student ratio required per section for each clinical mode of instruction.

Faculty/Student Contact Hours: A total of 56,675 faculty/student contact hours was determined by multiplying the hours of instruction in each mode by the number of sections per mode for 100 students.

FTE Faculty Requirements for Instruction

The panelists determined the amount of faculty time spent in preparation and evaluation activities related to instruction. Table CD-11 presents the number of hours considered necessary for preparation and evaluation per direct contact hour.

They then selected, for the purpose of estimating faculty size, an average work year of 2,400 hours--50 hours a week for 48 weeks.

Table CD-12 displays the number of the FTE clinical science faculty needed for dental instruction. Of the total hours needed for instruction, 79 percent is spent in student contact time, and 21 percent in preparation and evaluation.

FTE Faculty Requirements for Education

The Education Model: In addition to faculty time needed for D.D.S. instruction, the panelists agreed that clinical scientists must spend time in research activities to provide a complete program of undergraduate dental education. The panelists' first approach to determining how much faculty time should be devoted to research was to develop a model of a dental school where D.D.S. education was the primary program. In this institution, activities that contribute to research are included only to the extent that they are essential to the education of D.D.S. students; no independent research is carried on for its own sake.

The following assumptions were used to translate the 29.9 FTE faculty needed for D.D.S. instruction--hereafter represented by the symbol I_D--to an FTE faculty for D.D.S. education, E_D:

- a faculty member must spend 10 percent of his time in research activities to maintain his competence as an instructor of dental students. This variable is represented as R_D

TABLE CD-10

Summary of Characteristics of Clinical Sciences Modes of Instruction

Mode of instruction	Instructional hours	Number of sections per 100 students	Faculty-student ratio
Total	3750		
Pre-clinical	1250		
Lecture	425	1	1 to 100
Laboratory	425	10	1 to 10
Seminar	200	10	1 to 10
Self-instruction	200	N/A	N/A
Clinical-supervised Patient care	2500	20	1 to 5

TABLE CD-11

Preparation and Evaluation Time Per Direct Contact Hour by Mode of Instruction

Mode of Instruction	Preparation and Evaluation Hours	
	Per direct contact hour	Total
Total		15,200
Pre-clinical		10,200
Lecture	3.0	1,275
Laboratory	0.5	2,125
Seminar	3.0	6,000
Self-instruction	4.0	800
Clinical supervised patient care	0.1	5,000

TABLE CD-12

FTE Clinical Science Faculty Needed for D.D.S. Instruction

(1)	Total hours of direct contact time	56,675
(2)	Total hours of preparation and evaluation	15,200
(3)	Total hours needed for instruction	71,875
(4)	Number of FTE's for instruction (row 3÷ 2,400)	29.9

- a faculty member must spend 20 percent of his time in private patient care activities to maintain his competence as an instructor of dental students. This activity is conducted intramurally--within the dental school--and is represented as PC_D

- a faculty member should spend 10 percent of his time in public service activities, professional development, and writing. The combination of these activities is represented by the symbol SDW_D.

As shown in Table CD-13, the 29.9 FTE clinical science faculty represents 50 percent of total FTE's needed for instructing dental students. The total faculty size is computed by dividing the 29.9 instructional FTE's by 0.50, giving 59.8 or 60 FTE clinical science faculty for dental education. The distribution of these 60 FTE's to activities is displayed in Table CD-13.

Although 60 FTE's are adequate to carry on the D.D.S. education program, only 54 FTE's or 90 percent of the total faculty time available is absorbed in activities directly related to the D.D.S. education program. The remaining 10 percent of the time available can be directed toward graduate and allied health education, independent research and other patient care. Since the education model was not designed to take advantage of this additional time, represented by the 6 FTE's in Table CD-13, the panelists developed a multi-purpose institution.

The Multi-Purpose Institution: Recognizing that the education model is neither a reasonable representation of reality, not a complete model for the purposes of cost determination, the panelists developed a dental model in a health sciences center with independent programs in dental research, graduate, and allied health education. Although these activities in the multipurpose institution could result in independent outputs, the constraints of the constructed costs process limited the size of these activities to a level consistent with an institution whose primary focus remained D.D.S. education. Thus, no resources were estimated for a large scale research institute or graduate education program.

An adequate faculty size for the multi-purpose institution (MP) was developed from the following assumptions:

- the number of FTE's needed to carry out the D.D.S. instruction program (I_D) remains at 30. While the percent of time spent in instructional activities remains at 50 percent, the time devoted to D.D.S. instruction is reduced to 30 percent with the remaining 20 percent directed toward graduate and allied health instruction (I_O)

TABLE CD-13

FTE Clinical Faculty Required for Dental Education

Activity	E_D	=	I_D	+	PC_D	+	R_D	+	SDW_D	+	Additional Time
Percent distribution of time	100%	=	50%	+	20%	+	10%	+	10%	+	10%
FTE faculty required	59.8	=	29.9	+	12.0	+	6.0	+	6.0	+	6.0

- twenty percent of total clinical science faculty time should be devoted to research activities (R) in order to produce a viable, independent research program. Included in the 20 percent would be research essential to D.D.S. education (R_D), research essential to graduate and other education (R_O), and independent research (R_R).

- to maintain a faculty member's skills, 20 percent of clinician's time would be devoted to private patient care in an intramural setting

- as in the educational model, a faculty member should spend 10 percent of this time in public service activities, professional development, and writing (SDW).

Table CD-14 shows the distribution of time and faculty (during a 50 hour week) in a multi-purpose institution *where only full-time faculty are employed.*

Having determined that 100 full-time clinical faculty are necessary to operate a multi-purpose institution where the primary focus is D.D.S. education, the panelists agreed to create a more realistic institution by relaxing the strict full-time requirement to allow substitution of part-time for full-time faculty. The following assumptions were made in this substitution process:

- twenty-five part-time faculty would provide instruction one day a week. This is equivalent to five FTE clinical science faculty

- although 30 FTE faculty are still necessary for D.D.S. instruction, fewer FTE faculty are required for research, patient care and institutional support activities since part-time faculty do not ordinarily engage in these activities.

Table CD-15 shows the full-time and part-time FTE clinical science faculty required in a multi-purpose institution. The number of FTE faculty needed is reduced from 100 to 95 by substitution some part-time faculty for some of the full-time faculty.

Auxiliary Clinical Personnel

Dental assistants, hygienists, registered nurses, technicians and EDDA's are needed to staff both the teaching clinic and intramural patient care facilities. The panelists agreed that certified allied health personnel (as opposed to allied health students) should be employed. They believed that reliance on allied health students in the clinic was an inefficient way to provide patient care and detracted from the quality of the instructional process. The panel stipulated the number of auxiliary clinical personnel needed for both the education model and the multi-purpose institution, based on general judgments about the clinical experiences required of students and the intramural practice needs of faculty. Since the number of FTE's needed

TABLE CD-14

Full-Time Clinical Dental Faculty Required in a Multi-Purpose Institution

Activity	MP	=	I_D	+	PC_D	+	R_D	+	I_O	+	SDW
Percent distribution of time	100%	=	30%	+	20%	+	20%	+	20%	+	10%
Faculty Required	100.0	=	30.0	+	20.0	+	20.0	+	20.0	+	10.0

TABLE CD-15

Full-Time and Part-Time FTE Clinical Faculty in a Multi-Purpose Institution

Activity	MC	=	I_D	+	PC_D	+	R_D	+	I_O	+	SDW
Total FTE faculty required	95	=	30	+	18	+	18	+	20	+	9
Full-time faculty	90	=	27	+	18	+	18	+	18	+	9
Part-time faculty	5	=	3					+	2		

for the D.D.S. instructional program does not change, the increase in the clinical support staff from the education model to the model of the multi-purpose instituiton occurs only in the intramural patient care component.

Table CD-16 presents the distribution of auxiliary personnel in both models.

Clerical-Support Personnel

The panelist concluded that the clerical needs of faculty in both the education and multi-purpose institution models would be met by providing one clerical person for every four faculty. In the dental education program where there are 60 FTE's, this results in 15 clerical positions. In the multi-purpose institution where there are 95 FTE's, a clerical staff of 24 is needed.

Clinical Facilities

The clinical sciences panelists estimated that approximately 300 chairs would be required to meet the needs of the educational program in the multi-purpose institution. The following assumptions were made in determining the size of the clinical faculty:

- 200 chairs would be needed for the 200 students in the third and fourth years of dental training
- an additional 66 chairs would accomodate clinic experiences of first and second year students
- two chairs are needed for each FTE in the intramural patient care program. In the multi-purpose institution, 18 FTE's are allocated to intramural patient care, requiring an additional 36 chairs.

Summary

The clinical sciences workshop developed a 3,750 hour curriculum for a class of 100 dental students. They distributed that time among pre-clinical and clinical activities and defined five modes of instuction.

As a result of these judgments, 56,675 direct contact hours between faculty and students were calculated as necessary for the pure instruction of D.D.S. students. When preparation and evaluation time was determined, the total hours needed for instruction increased to 71,875. Based on a work year of 2,400 hours, 30 FTE's are needed for D.D.S. instruction.

TABLE CD-16

Auxiliary Personnel in Education and Multi-Purpose Institution Models

Type of personnel	Education Model			Model of a Multi-Purpose Institution	
	D.D.S. Instruction	Intramural patient care	Total	Additional Personnel intramural patient care	Total
Total	122	38	160	25	185
Dental Assistants	50 a/	18	68	12	80
Dental **Hygienists**	8	3	11	2	13
EDDAS b/	25c/	12	37	8	45
Registered nurses	5	0	5	0	5
Technicians	34d/	5	39	3	42

a/Assumes one dental assistant per two students.
b/Expanded Duty Dental Assistants.
c/Assumes one EDDA per four students.
d/Assumes the following distribution of technicians: Removable Prosthodontics, 8
Fixed Prosthodontics, 12
Orthodontics, 2
Periodontics, 1
Clinical Laboratory Technicians, 2
X-Ray Technicians, 3
Research Technicians, 6

In an education model where faculty spend time in research only to the extent that is is essential to D.D.S. education, the number of clinical science FTE's increases to 60. While these are enough FTE's to have a functioning institution, some faculty time is not utilized in the dental education program. A multi-purpose institution, in which independent research, and graduate and allied health education programs exist along with dental education, utilized that additional faculty time.

Where only full-time faculty are employed, 100 FTE's are needed. However, where both full-time and part-time faculty are used, 95 FTE's are able to provide the programs needed for a reasonable representation of a dental school as it would exist in a health science center.

This institution requires 185 auxiliary personnel and a clerical staff of 24. The chairs required for instruction and intramural private practice number 266 and 36 respectively.

Section C

Administrative Workshop in Dentistry

The administrative workshop in dentistry:

- estimated the personnel costs associated with the basic science and clinical science programs developed by those workshops.
- determined the physical space requirements of the basic and clinical sciences education programs and the annual operating costs associated with those requirements
- estimated space and resource requirements, and their costs, for all other administrative and centralized support activities, and
- distributed all costs among the programs of D.D.S. education, other education, research, and intramural patient care, in order to obtain the average per student costs of the D.D.S. education program.

Section C presents the conclusions of the administrative workshop on the first three of these tasks. Section D describes the methodology for allocating costs among programs and summarizes the assumptions used by the administrative panel.

Estimating the Personnel Costs Associated with the Basic and Clinical Science Programs

The administrative panel estimated total personnel costs for a FTE faculty size of 123 (28 Basic Sciences FTE Faculty and 95 FTE clinicians), and support staff personnel numbering 305.* Table CD-17 displays the average annual salaries used by the Administrative Workshop in assigning costs to these personnel, and presents the total personnel costs for the full academic program. Other Direct Operating Costs, estimated at seven percent of base salaries in the basic sciences and 30 percent in the clinical sciences, include costs such as supplies, travel, printing, and telephone, not related to the research program. The doubling of clinical sciences other direct costs over the amount specified in the basic sciences takes account of the high supply costs associated with maintaining clinical facilities. Fringe benefits are calculated at 15 percent of salaries for basic and clinical science faculty, and support staff.

Estimating the Facilities Required for Instruction and Academic Office Space and Annual Operating Costs

The administrative panel estimated the facilities required for all instructional space--classroom, laboratories, conference rooms, clinic space--office space for faculty and clerical staff,** and research laboratory space for faculty and graduate students. In addition, intramural practice space requirements were specified. Tables CD-18, CD-19, and CD-20 summarize the methods used in estimating these space requirements and the total annual costs associated with the space. The following assumptions were used in all estimates of space *requirements:*

1. *Net Interior Usuable Space* is assumed to be 57.5 percent of gross space, resulting in a gross to net square foot ratio of 1.7 to 1.

2. *Initial Project Costs* would average $57.50 per gross square foot, including planning and design, architectual fees, construction, interior finishing and equipment to operate all aspects of plant

3. *Annual Use Cost* would average 5.5 percent of initial project costs, or $3.16 per gross square foot. This estimate is based on annual depreciation rates of 10.0 percent for equipment and 3.3 percent for buildings as suggested by OMB circular A-21. It was assumed that equipment comprises 33 percent of total project costs and space comprises 67 percent of to those costs. Thus, (10.0% x .33) + (33% x .67) = 5.5%.

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*Costs of stipends for 10 Ph.D. candidates and 100 clinical postgraduate students were not included. The panelists specified that the costs of these stipends are rarely assumed by the dental school.

**Including departmental conference rooms.

TABLE CD-17

Personnel Costs Associated with the Basic and Clinical Sciences Programs in Dentistry

Cost category	Number of personnel	Average annual salary (1973 estimates)	Total costs
Basic Sciences Program			
Faculty salaries	28	$22,000	$ 616,000
Clerical salaries	10	7,500	75,000
Technician salaries	22	8,000	176,000
Fringe Benefits at 15% of Salaries			130,050
Other Direct Operating Costs at 7% of salaries			60,690
Sub-total - Basic Sciences			$1,057,740
Clinical Sciences Program			
Faculty salaries	95	$30,000	$2,850,000
Support staff salaries a/			
D.D.S. Administrators	6	30,000	180,000
Dental Assistants	82	7,000	574,000
Dental Hygienists	15	12,000	180,000
EDDA's	45	8,500	382,500
Registered Nurses	6	12,000	72,000
Technicians	54	10,000	540,000
Clerical	30	7,500	225,000
Other Non-professionals	35	7,500	262,500
Fringe Benefits at 15% of salaries			789,900
Other Direct operating costs at 30% of salaries			1,579,800
Sub-total - Clinical Sciences			$7,635,700
Total Academic Program			$8,693,440

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a/The total support personnel of 273 was developed as follows: the clinical sciences workshop stipulated a need for 209 support personnel (including clerical staff) and the administrative workshop stipulated an additional 64 support personnel to staff the central service and support areas of the supervised patient care clinic.

TABLE CD-18

Instructional Space Requirements

(Actual Dollars)

(1) Type of facility	(2) Seats/ unit	(3) Square feet/unit	(4) Number of units	(5) Total capacity	(6) Total square feet and cost (3) X (4)
Basic Sciences					
Lecture halls	125	2,000	2	250	4,000
Seminar rooms	25	400	7	175	2,800
Multi-purpose laboratory	100	7,500	1	100	7,500
Gross anatomy laboratory	120	3,800	1	120	3,800
Total net square feet					18,100
Gross square feet @ 170% of net					30,770
Initial cost @ $57.50 per gross square foot					$1,769,275
Annual use cost @ 5.5% of initial cost					$ 97,310
Operations and maintenance @ $2.50 / gross square foot					76,925
Total annual cost					$ 174,235
Clinical Sciences					
Lecture halls	125	2,000	1	125	2,000
Seminar rooms	25	400	5	125	2,000
Multi-purpose laboratories	100	7,500	1	100	7,500
Clinic space					
Central services and central support areas					25,000
Cubicle space					27,900 a/
Total net square feet					64,400
Gross square feet @ 170% of net					109,480
Initial cost @ $57.50 per gross square foot					$6,295,100
Annual use cost @ 5.5% of initial cost					346,231
Operations and maintenance @ $2.50/gross square foot					273,700
Total annual cost					619,931
General Purposes					
Amphitheatre	500	5,000	1	500	5,000
Total net square feet					5,000
Gross square feet @ 170% of net					8,500
Initial cost @ $57.50 per gross square foot					$488,750
Annual use cost @ 5.5% of initial cost					26,881
Operations and maintenance @ $2.50/gross square foot					21,250
Total annual cost					$ 48,131

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a/ A total of 275 cubicles of which 20 are for oral surgery @ 120 net square feet/cubicle and remainder are standard general units @ 100 net square feet/cubicle.

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TABLE CP-19

Faculty and Clerical Office Space and Research Laboratory Requirements

(Actual Dollars)

(1) Type of facility	(2) Seats/ unit	(3) Square feet/unit	(4) Number of units	(5) Total capacity	(6) Total square feet and cost (3) X (4)
Basic Sciences					
Faculty offices	1	110	28	28	3,080
Clerical offices	1	80	10	10	800
Research laboratories	N/A	400	28	N/A	11,200
Departmental conference rooms	30	300	6	180	1,800
Total net square feet					16,880
Gross square feet @ 170% of net					28,696
Initial cost @ $57.50 per gross square foot					$1,650,020
Annual use cost @ 5.5% of initial cost					90,751
Operations and maintenance @ $2.50/ gross square foot					71,740
Total annual cost					$ 162,491
Clinical Sciences					
Faculty offices	1	110	95	95	10,450
Clerical offices a/	1	80	20	20	1,600
Research laboratories	N/A	400	19	N/A	7,600
Departmental conference rooms	30	300	6	180	1,800
Total net square feet					21,450
Gross square feet @ 170% of net					36,465
Initial cost @ $57.50/gross square foot					$2,096,738
Annual use cost @ 5.5% of initial cost					115,321
Operations and maintenance @ $2.50/gross square foot					91,163
Total annual cost					$ 206,484

a/Although the Clinical Workshop specified the need for 25 clerical positions, five of them are associated with intramural practice area, and therefore are not charged to instructional space.

TABLE CD-26

Intramural Practice Space Requirements

(Actual Dollars)

(1) Type of facility	(2) Seats/ unit	(3) Square feet/ unit	(4) Number of units	(5) Total capacity	(6) Total square feet and cost
General dental	1	100	33	33	3,300
Specialty	1	120	3	3	360
Central service and central support area					2,100
Total net square feet					5,760
Gross square feet @ 170% of net					9,792
Initial cost @ $57.50/gross square foot					$563,040
Annual use cost @ 5.5% of initial cost					30,967
Operations and maintenance @ $2.50/ gross square foot					24,480
Total annual cost					$ 55,447

4. *Annual Operating Costs*--utilities, maintenance, and security--would average $2.50 per gross square foot.

Clinic Operations

Two components of the clinic operation were estimated: (1) the supervised patient care clinics; and (2) the intramural patient care clinic.

Both clinics had *central support areas* which consisted of waiting rooms, registration space, screening (oral diagnosis and care assignment) rooms, space for records, storage, cashier, supplies, and clinic management offices.

Space requirements were also developed for *central service areas* which consist of a dispensary, radiology and sterilization areas, medical and oral pathology, and dental technology laboratories.

The total space estimated for both central support and central services areas in the supervised patient care clinic operation was 25,000 net square feet. It was estimated that only 2,100 net square feet. It was estimated that only 2,100 net square feet of space would be needed for the intramural practice clinic.

Finally, the panelists specified that general dentistry units would occupy 100 net square feet of space, while specialty units, such as oral surgery units, would need 120 net square feet of space.

Based on these assumptions, and the space requirements presented in Tables CD-18, CD-19, and CD-20, the total annual costs of instructional space, office space, research laboratories, and intramural practice space were estimated at $1,266,719, $336,726 of which would be attributed directly to the basic sciences program, and $881,862 to the clinical sciences program. Table CD-21 presents a summary of these costs.

Estimating the Personnel, Facilities, and Annual Operating Costs Required for Other Administrative and Centralized Support Activities

The administrative workshop estimated the personnel, space and equipment, and other resources necessary for administrative or centralized support services in an institution providing undergraduate dental education. The panel developed its estimates on the assumption that the dental school was a freestanding institution that did not share resources with other schools in a university or health sciences center.

Table CD-22 summarizes the annual operating costs associated with these types of services. A detailed description of each activity included in Table CD-22 is provided in Tables CD-23 through CD-29.

TABLE CD-21

Summary of Total Annual Costs of Space
in Basic and Clinical Science Programs

Cost category	Annual cost
Basic science program	
Instructional space	$174,235
Faculty and clerical office space	54,677
Research laboratory space	107,814
Subtotal	336,726
Clinical science program	
Instructional space	$619,931
Faculty and clerical office space	133,324
Research laboratory space	73,160
Intramural practice space	55,447
Subtotal	881,862
General purpose space	
Amphitheatre	$ 48,131
Total academic space requirements	$1,266,719

TABLE CD-22

Annual Operating Costs Associated with Administrative And Centralized Support Activities
(Dollars in Thousands)

Type of Activity	Annual Operating Costs
Centralized services	1,018,544
Library facilities	325,896
Educational resources, audio-visual & television department	268,321
Animal quarters	164,486
Computer operations	259,841
Administrative services	953,420
Student-related activities	223,017
Financial aid to students	45,000
Total operating cost	$2,239,981

TABLE CD-23

Library Facilities

Description:

- The size of the library facility assumes that individual study space will be provided in multi-purpose labs during first two years of D.D.S. program.

Salaries and expenses

4 Professionals (1 @ $20,000, 3 @ $15,000)	$65,000	
5 Non-professionals @ $7,500	37,500	
Fringe benefits @ 15% of salaries	15,375	
Other direct operating expenses @ 15% of salaries	15,375	$133,250

Space

Total net square feet of space for:	17,000	

- Stack
- Offices
- User seats
- Journal room
- Audio-visual library room
- Work and storage space
- Entrance, exhibit, front desk

Gross square feet of space @ 170% of net	28,900	
Initial cost @ $57.50/gross square foot	$1,661,750	
Annual cost @ 5.5% of initial cost	91,396	
Operations and maintenance @ $2.50/gross square foot	72,250	163,646

Books

°Number of initial volumes	25,000	
°Number of initial journals	2,000	
°Annual cost of 750 new volumes/year @ $20.00	$15,000	
°Annual cost of 500 journals/year @ $28.00	14,000	29,000
Total annual cost		$325,896

TABLE CD-24

Educational Resources, Audio-Visual, and Television Department

Description:

-includes medical illustration services, photography studios, projection and television facilities, and support services for producing self-instructional material and teaching aids.

-educational psychologists who assist faculty in designing programmed learning materials.

-high costs of supplies, maintenance, and repair of equipment estimated at $40,000.

Salaries and expenses

7 professionals (2 @ $20,000, 5 @ $13,000)	$105,000	
3 clerical @ $7,500	22,500	
Fringe benefits @ 15% of salaries	19,125	
Other Direct Operating Expenses @ 15% of salaries	19,125	$165,750

Space

Total net square feet of space	6,500	
Gross square feet of space at 170% of net	11,050	
Initial cost @ $57.50/gross square foot	$635,375	
Annual use cost @ 5.5% of initial cost	34,946	
Operations and maintenance @ $2.50/gross square foot	27,625	62,571
Extraordinary supply, maintenance and repair costs		40,000
Total annual cost		$268,321

TABLE CD-25

Animal Quarters

Salaries and expenses		
1 D.V.M.	$25,000	
3 Non-professionals @ $6,500	19,500	
Fringe benefits @ 15% of salaries	6,675	
Other direct operating expenses @ 15% of salaries	6,675	$57,850
Space		
Total net square feet of space	9,000	
Gross square feet of space @ 170% of net	15,300	
Initial cost @ $57.50/gross square foot	897,750	
Annual use cost @ 5.5% of initial cost	48,386	
Operations and maintenance @ $2.50/ gross square foot	38,250	86,636
Animal costs		20,000
Total annual cost		$164,486

TABLE CD-26

Computer Operations

Description

-IBM 370/165 or IBM 360/65 computer with 5 terminals and associated equipment

-Serves academic, research, and business purposes

Salaries and expenses		
5 Professionals (1 Director @ $30,000, 2 Designers and Programmers @ $12,000, 1 Operator for research @ $12,000, 1 Data coordinator @ $8,000)	$74,000	
1 Clerical	7,500	
Fringe benefits @ 15% of salaries	12,225	
Other direct operating expenses @ 15% of salaries	12,225	$105,950
Space		
Total net square feet of space	3,105	
Gross square feet of space @ 170% of net	5,279	
Initial cost @ $57.50/gross square foot	303,514	
Annual use cost @ 5.5% of initial cost	$16,693	
Operations and maintenance @ $2.50/gross square foot	13,198	29,891
Equipment rental		124,000
Total annual cost		$259,841

TABLE CD-27

Administrative Services

Description

-Includes offices of the dean, personnel, affirmative action, business and fiscal services, public relations and publications, grants (sponsored programs) administration, and fund raising

-Includes space for support and maintenance facilities such as central telephone switchboard, power plant, post office, student health service, repair shops, garages, central xeroxing, locker rooms and lounges and cafeteria

Salaries and expenses

Dean	$40,000	
Associate Dean	38,000	
3 Assistant Deans @ $35,000	105,000	
2 Personnel officers (1 @ $24,000, 1 @ $16,000)	40,000	
Affirmative Action officer	15,000	
Business and fiscal officers (1 @ $28,000, 1 @ $22,000, 1 @ $18,000, 1 @ $16,000)	84,000	
Public relations officer	20,000	
Grants administration officer	20,000	
Fund raising officer	20,000	
23 Clerical @ $7,500	172,500	
Fringe benefits @ 15% of salaries	83,175	
Other direct operating expenses @ 15% of salaries	83,175	$720,850

Space

Total net square feet of space	24,160	
Gross square feet @ 170% of net	41,072	
Initial cost @ $57.50/square foot	$2,361,640	
Annual use cost @ 5.5% of initial cost	129,890	
Operations and maintenance @ $2.50/gross square foot	102,680	232,570
Total annual cost		$953,420

TABLE CD-28

Student-Related Activities

Description

-includes offices of admissions, registrar, financial aid, and student services

-includes student supply store

Salaries and expenses

5 Professionals @ $20,000	$100,000	
8 Clerical @ $7,500	60,000	
Fringe benefits @ 15% of salaries	24,000	
Other direct operating expenses @ 15% of salaries	24,000	$208,000

Space

Total net square feet of space	1,560	
Gross square feet of space @ 170% of net	2,652	
Initial cost @ $57.50/square foot	$152,490	
Annual use cost @ 5.5% of initial cost	8,387	
Operations and maintenance @ $2.50/gross square foot	6,630	15,017
Total annual cost		$223,017

TABLE CD-29

Financial Aid to Students

Description

-in 1971-72 the average stipend per student from all sources of loans and grants was:

public schools	$ 867
private schools	$1,120

-schools provided an average stipend per sutdent of:

public schools	$ 88.38
private schools	$116.32

-total average stipend for 400 students in both public and private schools was $40,922

-Allowing for a 10 percent cost of living increase, the financial requirements to be supported by the dental school budget would be $45,000.

Section D

Allocating Costs of Programs

After determining the costs of all activities that take place in the constructed institution, the administrative workshop developed rules for allocating costs to the programs of D.D.S. education, graduate and allied health education, intramural patient care, and research Section D describes the methods that were used to allocate costs of the basic and clinical sciences, including instructional and faculty office space, and the administrative and centralized support activities.

Allocating the Costs of the Basic Sciences Program

Table CD-9 presented the distribution of time for the 27.5 FTE faculty members in the multi-product institution designed by the basic sciences workshop. Service, professional development and writing activities account for 14.2 percent or 4.0 of these FTE's. These "overhead" activities evolve from and support the faculty members' primary missions of education and research, and they can be allocated to these missions without distorting the general distribution of faculty time within the institution. When the 4.0 FTE's are allocated proportionately to the other activities, the resulting distribution of the 27.5 FTE's is shown in Table CD-30. Based on this distribution of faculty time, the costs of basic science personnel were allocated to the three programs of D.D.S. education, graduate education, and research.

As indicated earlier in Chapter 3, joint activities in the Basic Sciences program result from the overlaps between research and D.D.S. education, research and graduate education, and D.D.S. education and graduate education. Since there is no obvious way to allocate the cost of faculty time that contributes to more than one program, the decision was made to distribute joint costs in proportion to the total size of the various programs benefitting from them. For example, since the number of FTE's needed for the D.D.S. education program is 15.7*

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*The FTE's for D.D.S. education were computed at 15.7 in the discussion on the basic sciences faculty size. The 15.7 FTE's include 8.3 FTE's for instruction of D.D.S. students, 1.9 FTE's for joint D.D.S./Other instruction, and 5.5 FTE's for research considered essential to D.D.S. education.

TABLE CD-30

Distribution of Basic Science FTE's to Activities

Activity	MP	= I_D	+ I_O	+ R
Percent distribution of time	100%	= 30%	+ 12%	+ 58%
FTE Faculty required	27.5	= 8.3	+ 3.3	+ 15.9

and the number needed for the doctoral/other education program is 6.5,** then the costs of the joint D.D.S./other education activities would be divided between the two programs, respectively, according to the ratios 15.7/22.2 and 6.5/22.2.

Figure CD-1 describes the direction in which joint faculty activities were allocated in the basic sciences based on this proportional distribution system and Table CD-31 presents the actual program allocations.

Allocating joint activities produces the following percentage distribution of faculty FTE's by program:

D.D.S. Education - 44.7% or 12.3 FTE's

Other Education - 10.6% or 2.9 FTE's

Research - 44.7% or 12.3 FTE's

The total costs of clerical and technical personnel were then allocated to the three programs on the same basis as faculty costs.

Table CD-32 displays the allocation of the costs of the basic sciences program to the three programs of D.D.S. education, graduate and other education, and research.

Allocating the Costs of the Clinical Sciences Programs

Table CD-15 presented the distribution of the 95 FTE faculty required, by activity, for the program developed by the clinical sciences workshop, with the approximately 10 percent of faculty time spent in professional development, writing, and community service allocated proportionately to D.D.S. instruction, other instruction, research and patient care. Table CD-33 presents the resulting distribution of the 95 FTE's.

In clinical sciences, the joint activities to be allocated to the four programs of D.D.S. education, graduate and allied health education, intramural patient care, and research, are research essential to the education program, and research essential to the graduate and allied health programs.

The salary equivalent of the percent of faculty time spent in intramural parctice, is allocated to the intramural patient care program on the assumption that these costs are recoverable through intramural practice income.

Table CD-34 presents the distribution of faculty to programs.

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*The FTE's for other education were computed at 6.5. This includes 1.4 FTE's for instruction of other students, 1.9 FTE's for joint D.D.S./other instruction, and 3.2 FTE's for research essential to the other education program.

FIGURE CD-1

Distribution of Costs of Activities to Programs in the Basic Sciences

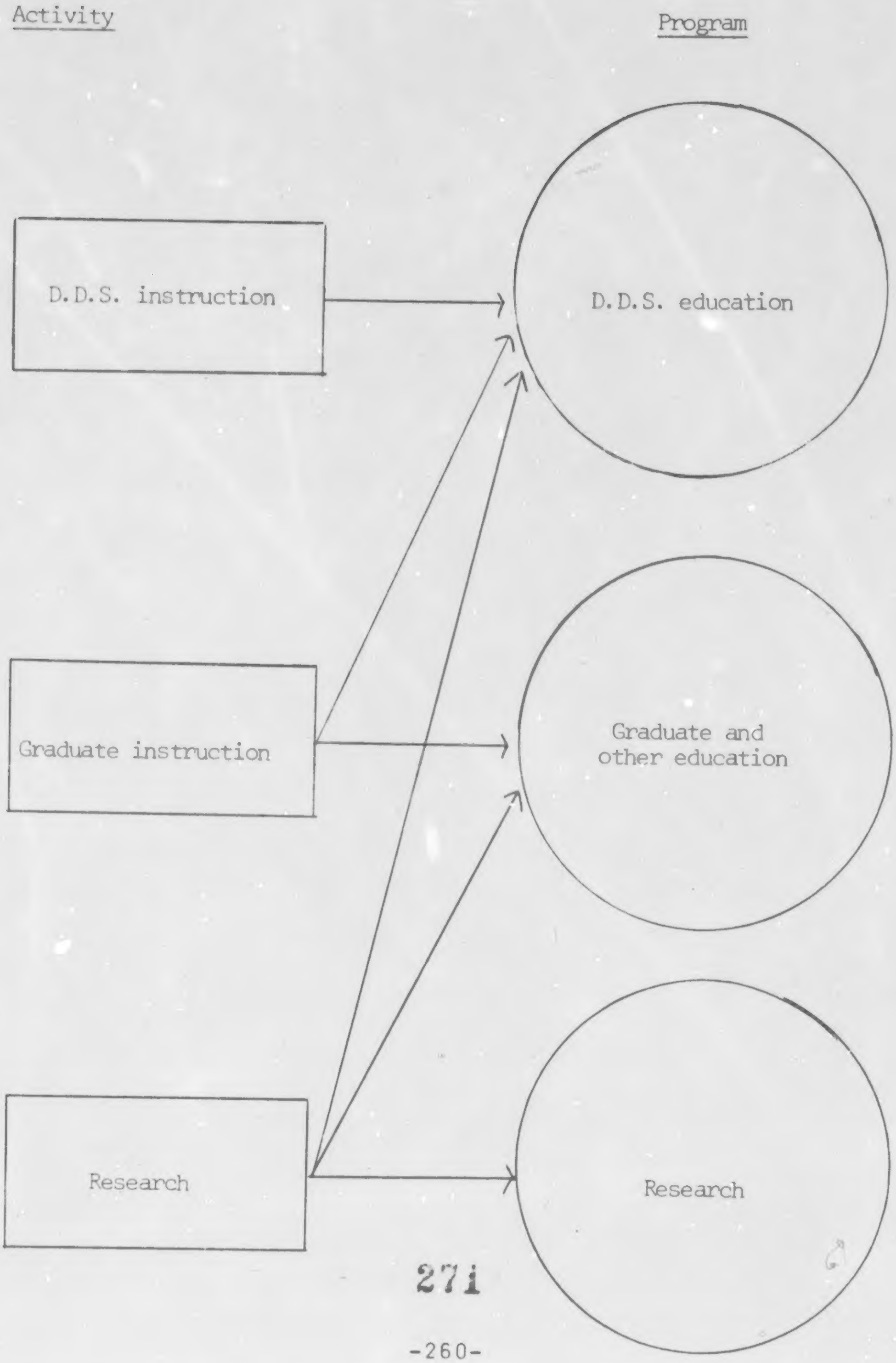
Activity
Program
D.D.S. instruction
D.D.S. education
Graduate instruction
Graduate and other education
Research
Research

TABLE CD-31

Distribution of Basic Sciences Dental Faculty Activities to Programs

Activity	Number of FTE's	Program distribution: D.D.S. education	Program distribution: Graduate/ other education	Program distribution: Research
D.D.S. instruction	8.3	8.3	-	-
Graduate instruction	3.3	1.3	2.0	-
Research	15.9	2.7	0.9	12.3
Total	27.5	12.3	2.9	12.3

TABLE CD-33

Distribution of Clinical Science FTE's to Activities

Activity	MP	=	I_D	+	I_{DO}	+	PC	+	R
Percent distribution of time	100%	=	35%	+	24%	+	21%	+	20%
FTE Faculty required	95.0	=	33.5	+	22.4	+	20.1	+	19.0

TABLE CD-34

Distribution of Clinical Science Dental Faculty Activities to Programs

		Program distribution			
Activity	Number of FTE's	D.D.S. education	Graduate and other education	Research	Intramural Patient care
Instruction	55.9	33.5	22.4	-	-
Research	19.0	4.2	2.4	12.4	-
Patient care	20.1	-	-	-	20.1
Total	95.0	37.7	24.8	12.4	20.1

Allocating joint activities produces the following percentage distribution of faculty FTE's, by programs.

D.D.S. education	39.7% or 37.7 FTE's
Graduate and other education	26.1% or 24.8 FTE's
Research	13.1% or 12.4 FTE's
Intramural patient care	21.1% or 20.1 FTE's

As with faculty costs, support staff associated with intramural practice have their costs allocated to that program. The remaining support staff are allocated totally to D.D.S. education. The panelists did not develop additional support personnel for the graduate and allied health program. Table CD-35 presents the distribution of the 273 support personnel to the programs of D.D.S. education, research and intramural patient care.

Table CD-36 displays the allocation of the costs of the clinical sciences program to the four programs of D.D.S. education, graduate and other education, research and intramural patient care.

Allocating Annual Operating Costs Associated with Space Requirements for the Academic Program

The instructional, laboratory, and office space associated with the academic program in basic and clinical sciences were allocated to the four programs of the constructed cost model according to a series of allocation rules developed by the administrative workshop, and summarized in Table CD-37. Indirect costs of operating the intramural clinic are costs borne by the D.D.S. Education program. Table CD-38 presents results of allocating the operating costs of these space requirements.

Allocating the Costs of the Administrative and Centralized Support Activities

The costs of the administrative and centralized support activities were also allocated to four of the programs of the constructed costs model according to allocation rules developed by the administrative workshop. Table CD-39 presents these fules, and the categories to which they apply. Table CD-40 presents the results of these allocations.

Summary Distribution of Constructed Costs to Programs

When the costs of the academic, administrative and centralized activities are added together, the total cost of the D.D.S. program in the constructed model equals $7,076,091. When this number is divided by 400 D.D.S. students, the per student cost is $17,690. Table CD-41 summarizes these calculations.

TABLE CD-35

Distribution of Clinical Support Personnel

Personnel by type	Number of personnel	Program distribution		
		D.D.S. education	Research	Intramural patient care
Total	273	202.5	2.5	68.0
D.D.S. administrators	6	6.0a/	0	0
Dental assistants	82	52.0b/	0	30.0
Dental hygienists	15	10.0b/	0	5.0
EDDA's	45	25.0	0	20.0
Registered nurses	6	6.0c/	0	0
Technicians	54	44.0d/	2.0	8.0
Clerical	30	24.5	0.5	5.0
Other non-professionals	35	35.0e/	0	0

a/Administers clinic operations, including oral diagnosis and assignment of cases to students.
b/Two serve central support areas of clinic.
c/One serves central support area of clinic.
d/Twelve serve central support area of clinic.
e/All serve in central service area of clinic.

TABLE CD-[illegible]

Distribution of Clinical Sciences Salaries
And Expenses to Programs

Cost categories	Total costs	Program distribution			
		D.D.S. education	Graduate and other education	Research	Intramural patient care
Faculty costs	$2,850,000a/	$1,131,450	$ 743,850	$373,350	$ 601,350
Support staff					
D.D.S. administrators	180,000b/	180,000	-	-	-
Dental assistants	574,000c/	361,620	-	-	212,380
Dental hygienists	180,000c/	113,400	-	-	66,600
EDDA's	382,500d/	214,200	-	-	168,300
Registered nurses	72,000b/	72,000	-	-	-
Technicians	540,000e/	437,400	-	21,600	81,000
Clerical	225,000f/	184,500	-	4,500	36,000
Other professional	262,500b/	262,500	-	-	-
Fringe benefits g/	789,900	443,924	111,376	60,032	174,568
Other direct operating expenses g/	1,579,800	887,848	222,752	120,065	349,135
Total	$7,635,700	$4,288,842	$1,077,978	$579,547	$1,689,333

a/Distributed as follows: 39.7%, D.D.S. education; 26.1%, graduate and other education; 13.1%, research; 21.1%, intramural patient care.
b/100 percent to D.D.S. education.
c/Distributed as follows: 63%, D.D.S. education; 37%, intramural patient care.
d/Distributed as follows: 56%, D.D.S. education; 44%, intramural patient care.
e/Distributed as follows: 81%, D.D.S. education; 4%, research; 15%, patient care.
f/Distributed as follows: 82%, D.D.S. education; 2%, research; 16%, intramural patient care.
g/Distributed in the same proportion as total salaries: 56.2%, D.D.S. education; 14.1%, graduate and other education; 7.6%, research; 22.1%, intramural patient care.

TABLE CD-37

Rules for Allocating Academic Space Requirements

Allocation formula	Categories covered	Description of formula	Percent distributed to each program			
			D.D.S. education	Graduate and allied health education	Research	Intramural patient care
1	Basic sciences instructional space, clinical sciences instructional space, amphitheatre	All costs to D.D.S. education	100	-	-	-
2	Basic sciences office space	Distribution based on allocation of time of basic science faculty	44.7	10.6	44.7	-
3	Research laboratory space	Distribution to D.D.S. and research programs based on ratio of FTE's in research essential to D.D.S. education divided by total FTE's in research	17.0(BS) 22.1(CS)	-	83.0(BS) 77.9(CS)	-
4	Clinical sciences office space	Distribution based on allocation of time of clinical sciences faculty with portion of faculty time spent in intramural practice charged to D.D.S. education	60.8	26.1	13.1	-

TABLE CD-38

Distribution of the Costs of Academic Space Requirements to Programs

Type of space	Total annual operating costs	Distribution to programs			
		D.D.S. education	Graduate and allied health education	Research	Intramural patient care
Basic science program					
Instructional space	$174,235	$174,235	-	-	-
Office space	54,677	24,441	$ 5,795	$24,441	-
Research laboratory space	107,814	18,328	-	89,486	-
Subtotal	336,726	217,004	5,795	113,927	
Clinical Sciences program					
Instructional space	619,931	619,931	-	-	-
Office space	133,324	81,061	34,798	17,465	-
Research laboratory space	73,160	16,168	-	56,992	-
Intramural practice space	55,447	55,447	-	-	-
Subtotal	881,862	772,607	34,798	74,457	-
Amphitheatre	48,131	48,131	-	-	-
Total costs	$1,266,719	$1,037,742	$40,593	$188,384	

TABLE CD-39

Rules for Allocating Administrative and Centralized Support Activities

Allocation formula	Categories covered	Description of formula	Percent distributed to each program			
			D.D.S. education	Graduate and allied health education	Research	Patient care
1	Financial aid to students	All costs to M.D. education	100	-	-	-
5	Library	Distribution first weighted by use: D.D.S. student = 1, graduate student = 2, allied health = 0.25, faculty = 2. Faculty costs then distributed to programs based on weighted average of distribution of basic and clinical sciences' faculty time in each program	78.3	14.5	7.2	-
6	Educational resources, audio visual and television department	Distribution first weighted by use: D.D.S. students = 1, graduate students = 0.50, faculty = 0.25, allied health = 0.75. Faculty costs then distributed to programs based on weighted average of distribution of basic and clinical sciences faculty time to each program.	38.3	57.6	4.1	-
7	Animal quarters	Eighty percent of costs to research program, 20% to D.D.S. education.	80.0	-	20.0	-
8	Computer operations, administrative services	Weighted average of distribution of basic and clinical sciences faculty time spent in each program	57.2	22.6	20.2	-
9	Student related activities	Distribution based on number of students	66.0	34.0	-	-

TABLE CD-40

Distribution of the Costs of Administrative and Centralized Support Activities to Programs

Type of activity	Total annual operating costs	Distribution to programs			
		D.D.S. education	Graduate and allied health education	Research	Intramural patient care
Centralized services	$1,018,544	$ 539,151	$260,768	$218,625	
Library facilities	325,896	255,057	47,403	23,436	
Educational resources, Audio visual, and Television dept.	268,321	102,568	154,641	11,112	
Animal quarters	164,486	32,897	-	131,589	
Computer operations	259,841	148,629	58,724	52,488	
Administrative services	953,420	545,356	215,473	192,591	
Student-related activities	223,017	147,191	75,826	-	
Financial aid to students	45,000	45,000	-	-	
Total annual operating costs	$2,239,981	$1,276,698	$552,067	$411,216	

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TABLE CD-41

Summary Distribution of Constructed Costs to Programs

Cost category	Total annual operating costs	Distribution to programs			
		D.D.S. education	Graduate and allied health education	Research	Intramural patient care
Basic sciences program					
Salaries and expenses	$1,057,740	$ 472,809	$ 112,122	$ 472,809	--
Annual operating costs of space	336,726	217,004	5,795	113,927	--
Clinical sciences program					
Salaries and expenses	7,635,700	4,288,842	1,077,978	579,547	$1,689,333
Annual operating costs of space	881,862	772,607	34,798	74,457	--
Subtotal					
Amphitheatre	48,131	48,131	--	--	--
Administration and support	2,239,981	1,276,698	552,067	411,216	--
Total	$12,200,140	$7,076,091	$1,782,760	$1,651,956	$1,689,333
Cost per D.D.S. student		$17,690			

Attachment 4 to Chapter 2

DELIBERATIONS OF THE CONSTRUCTED COSTS SEMINAR IN VETERINARY MEDICINE

The constructed costs model in veterinary medicine was designed by seven veterinary medical educators during a one day seminar in November, 1973. Because of the constraints of time, the participants developed a model only of the faculty resources necessary for providing a good undergraduate veterinary medical education, and did not estimate all the additional resources necessary for a complete institution.

This attachment presents the results of the constructed costs seminar in veterinary medicine. Section A describes the deliberations relevant to the basic sciences, and Section B the clinical sciences. Section C discusses the allocation of faculty resources in the constructed institution.

Section A

Basic Sciences Curriculum in Veterinary Medicine

Defining a Curriculum

Length of Time and Subject Areas. The basic sciences curriculum is based on 2,350 hours of direct faculty contact in basic science instruction for a class size of 100 D.V.M. students. A distribution of the hours of instruction among all subject areas included in the basic sciences curriculum is shown in Table CVM-1. Pre-clinical subject areas (non-patient care clinical studies) are included in the categories specified below.

Modes of Instruction for Basic Sciences. Five modes of instruction were defined for each subject area: lecture, laboratory, seminar, counseling and examinations.

Table CVM-2 summarizes the number of sections into which a class of 100 students should be divided and the faculty to student ratio per section for each mode of instruction.

TABLE CVM-1

Distribution of Basic Sciences Hours of Instruction by Subject Area

Subject area	Hours of instruction	
	Number	Percent
Total	2,350	100
Anatomy a/	695	30
Microbiology	402	17
Parasitology	200	8
Pathology b/	583	25
Physiology c/	470	20

a/Includes histology and biology.
b/Includes toxology
c/Includes biochemistry and pharmacology.

TABLE CVM-2

Summary of Characteristics of Basic Sciences Modes of Instruction

Mode of instruction	Percent distribution of student time a/	Number of sections per 100 students	Faculty/student ratio
Lecture	32	1	1 to 100
Laboratory	48	6	1 to 16
Seminar	14	11	1 to 9
Counselling	2	100	1 to 1
Examinations	4	1	1 to 100

a/This distribution applies to all basic science subject areas except anatomy and pathology, where the following distributions were used. Anatomy: lecture, 17 percent; laboratory, 73 percent; seminar, 5 percent; counseling, 2 percent; and examination, 3 percent. Pathology: lecture, 30 percent; laboratory, 46 percent; seminar, 19 percent; counseling, 2 percent; and examination, 3 percent.

Faculty/Student Contact Hours. A total of 16,334 faculty/student contact hours was determined by multiplying, in each subject area, the hours of instruction per week in each mode by the number of sections per mode for 100 students. The results of this calculation are shown in Table CVM-3.

FTE Faculty Requirements for Instruction

Table CVM-4 presents the panelists' determination of the number of hours considered necessary for preparation and evaluation per direct contact hour.

For the purposes of estimating faculty size, the panelists selected an average work year of 2,000 hours--40 hours a week for 50 weeks.

Table CVM-5 displays the number of FTE basic science faculty needed for the instruction of veterinary medical students. Of the total hours needed for instruction, 40 percent is spent in student contact time and 60 percent in preparation and evaluation.

FTE Faculty Requirements for Education

In addition to faculty time needed for D.V.M. instruction, the panelists agreed that basic scientists must spend time on other activities--most importantly research and instruction of graduate students. The panelists developed a faculty model of a veterinary medical school supporting independent programs of research and graduate education. Although these activities could result in independent outputs, the constraints of the constructed costs process limited the size of these activities to a level consistent with an institution whose primary focus is D.V.M. education. Thus, no resources were estimated for a large scale research institute or graduate education program.

The following assumptions were used to translate the 21.4 FTE faculty needed for D.V.M. instruction--hereafter represented by the symbol I_{DVM}--to an adequate FTE faculty for an institution in which there is more than one program, (MP):

- twenty percent of basic science faculty time should be directed toward graduate education. This variable is represented as I_G
- twenty-five percent of total basic science faculty time should be devoted to research activities (R) in order to produce a viable, independent research program. Included in the 25 percent would be research essential to D.V.M. education (R_{DVM}), research essential to graduate education (R_G), and independent research (R_R) conducted in response to national research priorities

TABLE CVM-3

Faculty Student Contact Hours by Subject Area
and Mode of Instruction

Subject area by mode	Hours of instruction	Number of sections per 100 students	Faculty/student contact hours (hours x sections)
Total hours-all subject areas	2,350		16,334
Anatomy			
Lecture	121	1	121
Laboratory	506	6	3,036
Seminar	34	11	374
Counselling	14	100	1,400
Examinations	20	1	20
Total	695		4,951
Microbiology			
Lecture	129	1	129
Laboratory	193	6	1,158
Seminar	56	11	616
Counselling	8	100	800
Examinations	16	1	16
Total	402		2,719
Parisitology			
Lecture	64	1	64
Laboratory	96	6	576
Seminar	28	11	308
Counselling	4	100	400
Examinations	8	1	8
Total	200		1,356
Pathology			
Lecture	169	1	169
Laboratory	270	6	1,620
Seminar	113	11	1,243
Counselling	11	100	1,100
Examination	20	1	20
Total	583		4,152
Pysiology			
Lecture	150	1	150
Laboratory	227	6	1,362
Seminar	66	11	726
Counselling	9	100	900
Examination	18	1	18
Total	470		3,156

TABLE CVM-4

Preparation and Evaluation Time per Direct Contact Hour by Mode of Instruction

Mode of instruction	Preparation and evaluation hours	
	Per direct contact hour	Total
Total	--	24,535
Lecture	4.0	2,532
Laboratory	1.5	11,628
Seminar	3.0	9,801
Counselling	0.0	0
Examination	7.0	574

TABLE CVM-5

FTE Basic Science Faculty Needed for D.V.M. Instruction

(1) Total hours of direct contact time	16,334
(2) Total hours of preparation and evaluation	24,535
(3) Total hours needed for instruction	40,869
(4) Number of FTE's for instruction (row 3 ÷ 2,000)	20.4

- a faculty member should spend five percent of his time in public service/extension activities. These activities involve the provision of public health and information services to the community. This variable is represented as S

- ten percent of a faculty member's time should be spent in activities related to the administration of the basic sciences program. This variable is represented by the symbol A.

As shown in Table CVM-6, the 20.4 FTE basic sciences faculty represents 40 percent of total faculty FTE's needed for instructing D.V.M. students. The total faculty requirement is computed by dividing the 20.4 instructional FTE's by 0.40, giving 51.0 FTE basic science faculty for the education of veterinary medical students and other activities. The distribution of these 51.0 FTE's to activities is displayed in Table CVM-6.

Summary

In the basic sciences session, panelists developed a 2,350 hour curriculum for a class size of 100 D.V.M. students. They distributed that time among broad subject areas and defined five modes of instruction.

As a result of these judgments 16,334 direct contact hours between faculty and students were calculated as necessary for the instruction of D.V.M. students. When preparation and evaluation time was determined, the total hours needed for instruction increased to 40,869. Based on a work year of 2,000 hours, 20.4 FTE's are needed for D.V.M. instruction.

In an institution where independent research and graduate education programs exist along with veterinary medical education, faculty spend a total of 40 percent of their time instructing D.V.M. students, 20 percent instructing graduate students, 25 percent in research activities, 5 percent in public service/extension activities, and 10 percent in administration. This institution requires 51.0 FTE faculty.

Section B

Clinical Sciences Curriculum in Veterinary Medicine

Defining a Curriculum

Length of Time and Subject Areas. The clinical science curriculum is based on 2,370 hours of direct faculty contact in clinical science instruction for a class size of 100 D.V.M. students. A

TABLE CVM-6

Distribution of FTE Basic Science Faculty Required in Constructed Veterinary Medical School

Activity	MP	=	I_{DVM}	+	I_G	+	R	+	S	+	A
Percent distribution of time	100%	=	40%	+	20 %	+	25%	+	5%	+	10%
FTE faculty required	51.0	=	20.4	+	10.2	+	12.7	+	2.6	+	5.1

distribution of the hours of instruction among all subject areas included in the clinical science curriculum is shown in Table CVM-7.

Modes of Instruction for Clinical Sciences. Five modes of instruction were defined for each subject area: lecture, laboratory, conference, supervised patient care and examination. Table CVM-8 summarizes the characteristics of the clinical sciences modes of instruction.

Faculty/Student Contact Hours. A total of 36,819 faculty/student contact hours was determined by multiplying, in each subject area, the hours of instruction per week in each mode by the number of sections per mode for 100 students. The results of this calculation are shown in Table CVM-9.

FTE Faculty Requirements for Instruction

Table CVM-10 presents the panelists' determination of the number of hours considered necessary for preparation and evaluation per direct contact hour.

For the purposes of estimating faculty size, they then selected an average work year of 2,000 hours--40 hours a week for 50 weeks.

Table CVM-11 displays the number of FTE clinical sciences faculty needed for the instruction of veterinary medical students. Of the total hours needed for instruction, 84 percent are spent in student contact time and 16 percent in preparation and evaluation.

FTE Faculty Requirements for Education

In addition to faculty time needed for D.V.M. instruction, the panelists agreed that clinical scientists must spend time on other activities--most importantly research and consultation. The panelists developed a faculty model of a veterinary medical school with research and professional consultation components. Although the research activity could result in an independent output, the constraints of the constructed costs process limited its size to a level consistent with an institution whose primary focus is D.V.M. education. Moreover, the panelists felt that the research program would be conducted in conjunction with the house officer education program.

The following assumptions were used to translate the 21.9 FTE faculty needed for D.V.M. instruction--hereafter represented by the symbol I_{DVM}--to an adequate faculty for an institution in which there is more than one program, (MP):

- a faculty member in the clinical sciences should spend 50 percent of his time instructing D.V.M. students (I_{DVM})

- twenty percent of clinical science faculty time should be devoted to clinical research activities (R). Fifteen percent of that time would involve research conducted with interns and residents ($R_{I/G}$); 5 percent would be research essential to D.V.M. education (R_{DVM})

TABLE CVM-7

Distribution of Clinical Sciences Instruction by Subject Areas

Subject area	Hours of instruction	
	Number	Percent
Total	2,370	100
Laboratory medicine a/	650	28
Medicine	695	29
Obstetrics	177	7
Public health	200	8
Radiology	110	5
Surgery	538	23

a/Includes clinical pathology and services, post-mortem and avian diseases.

TABLE CVM-8

Summary of Characteristics of Clinical Sciences Modes of Instruction

Mode of instruction	Percent distribution of student time	Number of sections per 100 students	Faculty/ student ratio
Lecture	24	1	1 : 100
Laboratory	9	6	1 : 16
Conference	6	11	1 : 9
Supervised patient care	56	25	1 : 4
Examinations	5	1	1 : 100

TABLE CVM-9

Faculty Student Contact Hours by Subject Area
and Mode of Instruction

Subject area by mode	Hours of instruction	Number of sections per 100 students	Faculty/student contact hours (hours x sections)
Total hours-all subject areas	2,370		36,819
Laboratory medicine			
Lecture	32	1	32
Laboratory	32	6	192
Conference	62	11	682
Supervised patient care	504	25	12,600
Examination	20	1	20
Total	650		13,526
Medicine			
Lecture	243	1	243
Laboratory	0	6	0
Conference	27	11	297
Supervised patient care	405	25	10,125
Examination	20	1	20
Total	695		10,685
Obstetrics			
Lecture	42	1	42
Laboratory	31	6	186
Conference	8	11	88
Supervised patient care	76	25	1,900
Examination	20	1	20
Total	177		2,236
Public health			
Lecture	54	1	54
Laboratory	54	6	324
Conference	7	11	77
Supervised patient care	65	25	1,625
Examination	20	1	20
Total	200		2,100
Radiology			
Lecture	24	1	24
Laboratory	18	6	108
Conference	5	11	55
Supervised patient care	43	25	1,076
Examination	20	1	20
Total	110		1,283
Surgery			
Lecture	181	1	181
Laboratory	67	6	402
Conference	26	11	286
Supervised patient care	244	25	6,100
Examination	20	1	20
Total	538		6,989

TABLE CVM-10

Preparation and Evaluation Time per Direct Contact Hour by Mode of Instruction

Mode of instruction	Preparation and evaluation hours	
	Per direct contact hour	Total
Total hours	--	6,996
Lecture	3.0	1,728
Laboratory	1.5	1,818
Conference	2.0	2,970
Supervised patient care	0.0	0
Examination	4.0	480

TABLE CVM-11

FTE Clinical Science Faculty Needed for D.V.M. Instruction

(1)	Total hours of direct contact time	36,819
(2)	Total hours of preparation and evaluation	6,996
(3)	Total hours needed for instruction	43,815
(4)	Number of FTE's for instruction (row 3 ÷ 2,000)	21.9

- twenty percent of a faculty member's time should be spent consulting with other professionals on patient referrals. This variable, represented by the symbol C, is usually not conducted in the presence of students

- a faculty member should spend five percent of his time in public service/extension activities. These activities involve the provision of public health and information services to the community. This variable is represented by the symbol S

- five percent of a faculty member's time should be spent in activities related to the administration of the clinical sciences program. This variable is represented by the symbol A

- there is no time provided for the separate instruction of house officers (interns and residents). House officers are considered part of the faculty in veterinary medical schools and the education they receive takes place when faculty engage in research with them.

As shown in Table CVM-12, the 21.9 FTE clinical science faculty represent 50 percent of total faculty FTE's needed for instructing D.V.M. students. The total faculty requirement is computed by dividing the 21.9 instructional FTE's by 0.50, giving 43.8 FTE clinical science faculty for the education of veterinary medical students and other activities. The distribution of these 43.8 FTE's by activity is displayed in Table CVM-12.

Summary

In the clinical sciences session, panelists developed a 2,370 hour curriculum for a class size of 100 D.V.M. students. They distributed that time among broad subject areas and defined five modes of instruction.

As a result of these judgments, 36,819 direct contact hours between faculty and students were calculated as necessary for the instruction of D.V.M. students. When preparation and evaluation time was determined, the total hours needed for clinical sciences instruction increased to 43,815. Based on a work year of 2,000 hours, 21.9 FTE's are needed for D.V.M. instruction.

In an institution where research and consultation activities exist along with veterinary medical education, faculty spend a total of 50 percent of their time instructing D.V.M. students, 20 percent in research activities, 20 percent in consultation with other professionals, 5 percent in public service/extension activities, and 5 percent in administration. This institution requires 43.8 FTE clinical faculty.

TABLE CVM-12

Distribution of FTE Clinical Science Faculty Required in a Constructed Veterinary Medical School

Activity	MP	=	I_{DVM}	+	R	+	C	+	S	+	A
Percent distribution of time	100%	=	50%	+	20%	+	20%	+	5%	+	5%
FTE faculty required	43.8	=	21.9	+	8.8	+	8.8	+	2.2	+	2.1

Section C

Allocation of Faculty Resources to Programs

After determining the time spent by faculty in the various activities of a veterinary medical school, the panelists distributed those activities to the programs of D.V.M. education, graduate education, house officer education, research, and service (including consultation, and public service/extension activities). Section C presents the distribution of these activities in both the basic and clinical disciplines.

Allocating Faculty Resources of the Basic Sciences Program

The activities of the 51.0 basic science FTE's presented in Table CVM-6 were allocated to the four programs of D.V.M. education, graduate education, research, and service. As discussed earlier in Chapter 2, joint activities in the basic sciences program result from the overlaps between research and D.V.M. education, and research and graduate education. In the veterinary medical program there is an additional area of overlap between D.V.M. education and service. Since there is no obvious way to allocate the costs of faculty time that contributes to more than one program, the panelists formulated best judgments as to the distribution of faculty time spent in a joint activity. Table CVM-13 presents the allocation of basic science faculty activities to programs.

Allocating joint activities produces the following percentage distribution of basic science faculty FTE's by program:

D.V.M. education = 56.3% or 28.7 FTE's
Graduate education = 32.9% or 16.8 FTE's
Research = 6.9% or 3.5 FTE's
Service = 3.9% or 2.0 FTE's

Allocating Faculty Resources to the Clinical Sciences Program

The activities of the 43.8 clinical sciences FTE faculty presented in Table CVM-12 were allocated to the three programs of D.V.M. education, house officer education, and service.

The problems of overlapping activities exist for clinical sciences as well as for basic sciences. Once again, the panelists formulated best judgments as to the distribution of faculty time spent in a joint activity. Table CVM-14 presents the allocation of clinical science faculty activities to programs.

TABLE CVM-13

Distribution of Basic Science Faculty Activities to Programs

Activity	Number of FTE's	Program distribution			
		D.V.M. education	Graduate education	Research	Service
Total	51.0	28.7	16.8	3.5	2.0
D.V.M. instruction	20.4	20.4			
Graduate instruction	10.2		10.2		
Research	12.7	5.1	5.1	2.5	
Service	2.6	1.1			1.6
Administration	5.1	2.1	1.5	1.0	0.5

TABLE CVM-14

Distribution of Clinical Sciences Faculty Activities to Programs

Activity	Number of FTE's	Program distribution		
		D.V.M. education	House officer education	Service
Total	43.8	27.6	9.2	7.0
D.V.M. instruction	21.9	21.9		
Research	8.8	2.2	6.6	
Consultations	8.8	2.2	2.2	4.4
Service	2.2			2.2
Administration	2.1	1.3	0.4	0.4

TABLE CVM-15

Distribution of FTE's in a Constructed Veterinary Medical School

Program	Distribution of FTE faculty	
	Number	Percent
Total	94.8	100%
D.V.M. education	56.3	59.4
Graduate education	16.8	17.7
House officer education	9.2	9.7
Research	3.5	3.7
Service	9.0	9.5

Allocating joint activities produce the following percentage distribution of clinical science faculty FTE's by program:

D.V.M. education = 63.0% or 27.6 FTE's
House officer education = 21.0% or 9.2 FTE's
Service = 16.0% or 7.0 FTE's

Summary

Table CVM-15 presents a summary of the distribution of the basic and clinical science FTE's by program.

ATTACHMENT 5 to CHAPTER 2

CONSTRUCTED COSTS SEMINAR FOR DENTISTRY

WORKBOOK

COSTS OF EDUCATION
OF THE
HEALTH PROFESSIONS

INSTITUTE OF MEDICINE
NATIONAL ACADEMY OF SCIENCES
Annapolis Hilton Inn
Annapolis, Maryland
September 19-21, 1973

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B-5: Number of clerical and technical support personnel needed to support the faculty specified in B-3

B-6: Summary worksheet - provided to record essential information for ease of future reference

Tab C: Clinical Sciences Questionnaire

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INTRODUCTION TO SEMINAR QUESTIONNAIRE

During the dental education seminar you will be asked to define the resources -- human, physical, and financial -- that are necessary to provide a "good" undergraduate dental education. This seminar process is not an effort to develop a single "normative" type of dental school, nor is it an effort to design an ideal educational environment. Rather, the purpose of this seminar is, (1) to estimate the resouces for undergraduate dental education, without describing the detailed structure within which these resources are organized; (2) to highlight and explain to the Congress and others the complex policy issues that must be considered in estimating the "annual average per student cost" of undergraduate dental education; and (3) to provide a reference point -- a constructed model -- that can be used to explore the determinants of the variation in costs of undergraduate dental education. The model that will emerge from this effort will express, explicitly, the judgments of individuals knowledgeable in the field of dental education.

During the constructed model process, you will be asked first to define a "good" dental educational program, by specifying what areas of knowledge in the basic sciences and what clinical experiences are necessary to educate a student to the D.D.S. degree. You will also be asked to specify what types of faculty activities (research, patient care, service) are necessary to ensure the provision of that program, assuming at this point in the model that faculty spend 100 percent of their time engaged in activities directly related to undergraduate dental education. Throughout this questionnaire, activities labeled "instruction" will be defined narrowly as the sum of direct contact hours and preparation and evaluation hours.

The second objective of the constructed modeling process is to define an operational dental school capable of providing the dental education program outlined earlier. This will necessitate determining the activities and resources that would be utilized by such an institution in order to produce a viable environment for dental education. Because of the complexity of these decisions, the questionnaire asks that you comment separately on the resource requirements needed in a free-standing institution and one in which certain functions (e.g., basic sciences instruction are shared with another professional school.

During these planning phases, numerous quantitative and qualitative judgments will have to be made. Not only are these judgments essential to the ultimate design of the model, but the discussion and arguments which lead up to them are important in themselves. Thus, the workshop materials and the discussion sessions at the seminar are designed to translate qualitative judgments into quantitative decisions about the scope of resources needed for D.D.S. education.

Attached you will find a questionnaire dealing primarily with the quantitative judgments necessary for constructing the model. The questions explore the resource requirements necessary to carry on a "good" D.D.S. or D.M.D. education program for a class size of 100 students:

(1) in the basic sciences

(2) in the clinical sciences

(3) in the areas of administration and central support services.

For the purpose of completing the questionnaires, each participant is assigned to a workshop that will address one of these three areas in particular detail.

The questionnaire is designed so that you can concentrate on the questions related to your particular area of expertise. However, we suggest that you read through all of the sets of questions before you begin answering any of them. It is particularly important that all participants understand the questions to be answered by the administrative group since these data will be used in pricing out the results of the basic and clinical sciences workshops at the Seminar.

You will notice that no reference data is enclosed. We prefer that you draw from your own experience and knowledge and arrive at judgments that are not influenced by data that staff has gathered. Resource material will be available at the seminar for use in comparing panelists' judgments with real world situations.

The purpose of the worksheets is to derive preliminary quantitative answers regarding the issues to be considered on September 19-21. The staff will attempt to combine the responses into a preliminary consensus, indicating the ranges in which answers to specific questions fall without identifying any individual participant's response. This summary of responses will provide a basis for discussions on various policy issues -- discussions that will attempt to get at the fundamental reasoning behind the numerical or quantitative worksheet answers.

In this regard, should you wish to attach a list of policy issues that occur to you as you complete the worksheets, it would provide additional guidance to the staff in preparing for the issue-oriented discussions.

Please complete the material for your workshop and return a copy of your responses. The materials should reach the Institute of Medicine by September 5 to give staff sufficient time to review the responses and organize them into working materials for the seminar. It is not necessary that you sign your completed worksheets, but please identify yourself in a cover letter so that the staff will know who has responded.

Each question in the attached questionnaire seeks to explain what is sought in the response. Sample worksheets for the Basic and Clinical Sciences Questionnaires are found in TAB E. The figures on the sample sheets are in no way meant to influence your figures. Extra worksheets are provided in each section. If you have any questions, please contact IOM staff members Peter Milgrom at (202) 961-1888, or Barbara Cohen at (202) 961-1721.

INTRODUCTION TO BASIC SCIENCES QUESTIONNAIRE

This section consists of six worksheets:

B-1: Number of hours needed for instruction of dental students.

B-2: Number of FTE faculty needed for a D.D.S. education program.

B-3: Viable faculty size for D.D.S. education in a free-standing institution.

B-4: Viable faculty size for D.D.S. education in a health sciences center.

B-5: Number of clerical and technical support personnel needed to support the faculty specified in B-3.

B-6: Summary Worksheet - provided to record essential information for ease of future reference.

Throughout these worksheets it is assumed that:

- The institution in which this program will take place will have a class size of 100 students.
- The D.D.S. candidates that this institution aims to produce are a typical mix of contemporary D.D.S. degree holders who can pass current licensing examinations.
- The institution should produce its share of general practitioners, specialists and academic dentists.
- Sample worksheets for each question can be found in TAB E . They are provided only to assist in figure placement. The numbers relate in no way to real situations.

BASIC SCIENCES QUESTIONNAIRE

B-1 HOW MANY HOURS ARE NEEDED FOR INSTRUCTION OF DENTAL STUDENTS IN THE BASIC SCIENCES?

On this worksheet you should calculate the total contact, preparation and evaluation hours in basic sciences subject areas necessary for the instruction of dental students. The purpose of this calculation is to isolate instructional activities such as lectures and laboratories from other activities in which faculty engage within a dental education setting.

Column (1): Without specifying an institutional or departmental organizational structure, list the basic sciences subject areas that must be covered by a dental student to qualify for the D.D.S. degree. We suggest the following subject areas: anatomy, biochemistry, histology, microbiology, physiology, pathology, and pharmacology. You may add other subjects including elective areas that you believe to be essential, but you should not list individual courses within a subject area. Record the list of subject areas in Column (1) of the Summary Worksheet (B-6).

Column (2): For each subject area listed, specify the total hours of instruction that should be provided and distribute these hours by type of instructional mode, (e.g. lecture, conference, supervised self instruction, laboratory, seminar, counseling, and tutorial with educationally disadvantaged students).

Column (3): Since for some modes the student body will have to be broken up into small groups, decide what size group of students is reasonable in each mode for each subject area. Divide the 100 students by these numbers and indicate the number of sections required for each type of instructional mode.

Column (4): Multiply Column (2) by Column (3) to compute the hours of instruction required by mode. This total represents the total hours of direct faculty contact time with dental students. Total the modes in each subject area.

Column (5): Estimate the total amount of preparation and evaluation time (e.g. time spent in direct preparation of lectures and laboratories, in background reading in areas of instruction, in preparation of self instruction materials, in preparing and grading examinations) required by the average faculty member to carry out his role as instructor in each subject area. In the discussion area below, indicate clearly the reasoning by which you arrived at this total. For example, explain in detail how many hours of preparation and evaluation are needed for each hour of lecture, conference or laboratory.

Column (6): Add Column (4) and Column (5) in each subject area to arrive at the total hours of faculty time needed for instruction of dental students in the Basic Sciences. Record these totals in Column (2) of the Summary Worksheet.

BASIC SCIENCES-1 WORKSHEET

Number of Hours of Faculty Time Needed
for Instruction of Dental Students
in the Basic Sciences

(1) Subject Areas	(2) Hours of instruction by mode	(3) Number of sections per 100 students	(4) Total hours of direct faculty contact time for instruction Column (2) x Column (3)	(5) Total hours of preparation and evaluation needed for instruction	(6) Total hours of faculty time for instruction Column (4) + Column (5)

Discussion Area:

B-2 HOW MANY FTE FACULTY ARE REQUIRED, (1) ASSUMING A FACULTY MEMBER ONLY ENGAGES IN DENTAL INSTRUCTION, (2) ASSUMING A FACULTY MEMBER MUST ENGAGE IN SOME RESEARCH AND ADMINISTRATION TO PERFORM ADEQUATELY HIS INSTRUCTIONAL ACTIVITIES?

On this worksheet you should calculate the amount of time faculty members spend in non-contact activities, other than preparation and evaluation, directly related and intrinsic to the education of dental students. For example, while a basic scientist might conduct a great deal of research, not all of it might be essential to his ability to function as an effective teacher. What is being sought here is a judgment as to what percentage of a faculty member's time (converted to hours) is related to his role as an instructor of dental students in the sense that without that minimal amount of time spent in research the faculty member would be unable to provide good dental instruction.

Column (1): Enter from Columns (1) and (2) of the Summary Worksheet (B-6) the total hours of faculty time for instruction by subject area.

Column (2): Calculate for each subject area the number of FTE (full-time equivalent) faculty required to provide the total number of instruction hours by dividing Column (1) by the number of man-hours in a man-year. For the purposes of this exercise, use 2000 hours as the number of man-hours in a man-year. (If you believe that another figure more accurately reflects the number of man-hours that a basic sciences faculty member works, discuss this in the area provided for comments.)

Column (3): Estimate the amount of non-contact faculty hours, excluding preparation and evaluation, required by the average faculty member to carry out his role as an instructor. This includes the following activities:

a. Research directly related to teaching undergraduates.

b. Administrative duties related to instruction (e.g., curriculum planning, writing letters of recommendation for students, travel related to teaching)

c. Other activities not included in one of the above categories. Please specify.

Column (4): Calculate the total amount of non-contact faculty time by adding (3a) + (3b) + (3c).

Column (5): Add Column (1) and Column (4) to arrive at the total number of hours of faculty time needed for dental education.

Column (6): Divide Column (5) by 2000 to compute the number of FTE faculty needed for undergraduate dental education. The quotient will represent, in FTE terminology, the number of faculty required to provide a dental basic sciences education program, rather than the number of real individuals. Enter this quotient in Column (3) of the Summary Worksheet.

BASIC SCIENCES-2 WORKSHEET

Number of FTE Faculty Needed for Dental Education

(1) Total hours of faculty time for instruction by subject area (from Summary Worksheet, B-6 Columns 1 & 2)	(2) FTE faculty needed to provide instruction Column (1) ÷ 2000	(3) Non-contact faculty hours for dental education			(4) Total hours of non-contact faculty time Columns (3a) + (3b) + (3c)	(5) Total hours of faculty time for dental education Column (1) + Column (4)	(6) FTE faculty needed for dental education Column (5) ÷ 2000
		(a) Research	(b) Administration	(c) Other			

Discussion Area:

B-3 WHAT IS THE MINIMUM VIABLE FACULTY SIZE NEEDED TO CARRY ON A DENTAL EDUCATION PROGRAM AND RELATED ACTIVITIES IN A FREE-STANDING INSTITUTIONAL SETTING?

On this worksheet, you should convert FTE faculty to "real" faculty and arrive at a minimum viable faculty size. This calculation recognizes that:

- there is a "critical mass" of faculty needed in each subject area to ensure coverage in all of the major basic sciences and to provide an adequate intellectual environment.
- faculty members engage in many activities other than those directly related to undergraduate dental education, such as independent research, public service activities, and teaching graduate and postgraduate students.
- a faculty member's teaching load, preparation time, and other responsibilities may vary.

For the purposes of this worksheet, you should assume that the dental school model you are constructing is a free-standing institution. You must, therefore, provide all basic science instruction with dental school faculty.

Column (1): Enter, from Columns (1) and (3) of the Summary Worksheet (B-6), the number of FTE faculty needed for dental education by subject area.

Column (2): Based on the considerations specified above (and other criteria which you feel are important), calculate what you believe to be reasonable numbers for viable faculty size in each subject area. Enter this total in Column (2), and in Column (4) of your Summary Worksheet (B-6).

Column (3): Explain the reasons for your estimates and what factors cause you to change the number of faculty from the FTE number shown in Column (1).

Discussion Area: Specify (1) what percent of the viable faculty can be expected to be full-time and what percent part-time, (2) whether clinicians could teach basic sciences subjects or vice versa, and (3) to what extent this would alter viable faculty size.

BASIC SCIENCES-3 WORKSHEET

Viable Faculty Size for Dental Education Program in the Basic Sciences in a Free-Standing Institution

(1) FTE faculty for a dental education program, by subject area (from Summary Worksheet, B-6, Columns 1 & 3)	(2) Viable faculty size needed for dental education program	(3) Explanations for differences between Columns (1) and (2)

Discussion Area:

B-4 WHAT IS THE MINIMUM VIABLE FACULTY SIZE NEEDED TO CARRY ON A DENTAL EDUCATION PROGRAM AND RELATED ACTIVITIES IN A HEALTH SCIENCES SETTING?

Using the same general considerations as in Worksheet B-3, make a judgment as to how viable faculty size would be altered if dental education was carried on in a health sciences center where basic sciences faculty are effectively shared with an on-going medical school.

Column (1): Enter from Columns (1) and (3) of your Summary Worksheet, B-6, the number of FTE faculty needed for dental education by subject area.

Column (2): Enter from Column (4) of your Summary Worksheet B-6, the viable faculty size by subject area in a free-standing institution.

Column (3): Calculate what you believe to be a reasonable viable faculty size in each subject area in a health sciences setting. Enter this total in Column (3) and again in Column (5) of your Summary Worksheet, B-6.

Column (4): Explain the differences first between Columns (1) and (3) for each subject area and then between Columns (2) and (3), especially with regard to the trade-offs between a free-standing and an affiliated institution.

BASIC SCIENCES-4 WORKSHEET

Viable Faculty Size for Dental Education Program in the Basic Sciences in a Health Sciences Center

(1) FTE Faculty for a Dental Education Program, by Subject Area (from Summary Worksheet, B-6, Columns 1 and 3)	(2) Viable Faculty Size Needed for Dental Education Program in a Free-Standing Institution	(3) Viable Faculty Size Needed for Dental Education Program in a Health Sciences Center	(4) Explanation for Differences Between Columns (1) and (3) and Columns (2) and (3)

Discussion Area:

B-5 HOW MANY CLERICAL AND TECHNICAL SUPPORT PERSONNEL ARE NEEDED TO SUPPORT THE VIABLE FACULTY SIZE ESTIMATED IN WORKSHEET B-3?

Column (1): Enter the faculty size by subject area recorded in Columns (1) and (4) of the Summary Worksheet (B-6).

Column (2): Estimate, by subject area, the number of clerical personnel you believe necessary to support this level of faculty in a free-standing institution. Be guided not by "ideal" standards, e.g., what size clerical staff you would recommend if there were no financial constraints; rather, be guided by current practice

Column (3): Estimate by subject area the number of technical personnel, including lab technicians, research assistants, etc., that you believe adequate for the faculty size specified in Column (1).

Comment in the space provided on the Worksheet on the reasoning behind your estimates of clerical and technical personnel. Taking into consideration laboratories as a mode of instruction, specify how many -- if any -- of the technical personnel should be associated with the instructional activities of the dental program.

Discussion: Indicate the differences in clerical and technical support personnel that would be needed to support the viable faculty in a health sciences center.

BASIC SCIENCES-5 WORKSHEET

Number of Clerical and Technical Support Personnel

(1) Faculty Size by Subject Area (from Summary Worksheet B-6, Columns (1) and (4)	(2) Number of Clerical Personnel	(3) Number of Technical Personnel	(4) Discussion Area

Discussion Area:

BASIC SCIENCES-6 WORKSHEET

Summary Worksheet

(1) Subject Areas (from B-1, Column 1)	(2) Total Hours of Faculty Time for Instruction (from B-1, Column 6)	(3) Number of FTE Faculty Needed for Dental Education (from B-2, Column 6)	(4) Viable Faculty Size Needed in a Free-Standing Institution (from B-3, Column 2)	(5) Viable Faculty Size in a Health Sciences Center (from B-4, Column 3)

INTRODUCTION TO CLINICAL SCIENCES QUESTIONNAIRE

This section consists of six worksheets:

C-1: FTE faculty needed for instruction in the pre-clinical didactic and laboratory courses.

C-2: FTE faculty needed for instruction in supervised patient care clinics.

C-3: Viable faculty size for a D.D.S. clinical program.

C-4: Dental auxiliary personnel needed in the clinic to support dental education.

C-5: Space requirements necessary to provide supervised patient care.

C-6: Summary Worksheets - provided to record essential information for ease of future reference.

Throughout these worksheets it is assumed that:

- The institution in which this program will take place will have a class size of 100 students.
- Summers are utilized as curriculum time for supervised patient care.
- The D.D.S. candidates that this institution aims to produce are a typical mix of contemporary D.D.S. degree holders who can pass current licensing examinations. This institution should produce its share of general practitioners, specialists, and academic dentists.
- In estimating resource requirements in Worksheet C-5, you are giving guidance to the Administrative Panel. Many central services, (e.g. radiology, laboratory, dispensary) will be handled by the Administrative Panel.

Sample worksheets for each question can be found in TAB E. They are provided only to assist in figure placement. The numbers relate in no way to real situations.

CLINICAL SCIENCES QUESTIONNAIRE

C-1 HOW MANY FTE FACULTY ARE NEEDED FOR INSTRUCTION IN THE PRE-CLINICAL DIDACTIC AND LABORATORY SUBJECT AREAS?

On this worksheet, you should calculate the total contact, preparation, and evaluation hours in pre-clinical didactic and laboratory subject areas necessary for the instruction of dental students. The purpose of this calculation is to isolate instructional activities in these two areas from other activities (e.g. research, administration, and intramural practice) in which faculty engage within a dental education setting.

Column (1): Without specifying an institutional or departmental organizational structure, list the pre-clinical didactic and laboratory subject areas in which a dental student must participate in order to be qualified for the D.D.S. degree. Please note that while some of these subject areas may overlap with those presented in the clinics, the modes of instruction sought here include everything except supervised patient care. A suggested list of pre-clinical didactic areas includes morphology, occlusion, growth and development, materials, behavioral sciences, clinical disciplines, radiology, preventive dentistry, clinical pharmacology, nutrition, community dentistry, anesthesiology, oral medicine, oral pathology, and cariology. A suggested list of straight pre-clinical laboratory subject areas includes restorative, prosthodontics, endodontics, pedodontics, orthodontics, and materials. You may add other pre-clinical experiences, including electives, that you believe essential. Record your responses in Column (1) and under the appropriate heading in Column (1) of the Summary Worksheet, C-6, Parts A and B. Include didactic subjects in Part A and laboratory subjects in Part B.

Column (2): Indicate the hours of instruction by mode (e.g. lecture, conference, demonstration, seminar, laboratory, supervised self instruction, counseling) in each subject area.

Column (3): Specify the average number of students assigned at any one time to each subject area.

Column (4): Based on the average number of students assigned to a subject area at any one time (Column 3) specify the number of students per section for the modes of instruction specified in each subject area.

Column (5): Divide Column (3) by Column (4) to calculate the number of sections needed per mode.

C-1, Continued

Column (6): Multiply Column (2) by Column (5) to derive the number of instructional contact hours per mode and add them together to obtain the total contact hours for each subject area.

Column (7): Estimate the total amount of preparation and evaluation time (e.g. time spent in direct preparation of lectures, labs, demonstrations or self-instructional materials in background reading in areas of instruction, in preparing and grading examinations or tutorials with disadvantaged students) required by the average faculty member to carry out his role as instructor in each subject area. In the discussion area, indicate clearly the reasoning by which you arrived at this total. For example, explain in detail how many hours of preparation and evaluation time are needed for each hour of lecture, conference or laboratory.

Column (8): Add the subject area totals in Column (6) to Column (7) to obtain the total hours needed for instruction in each subject area.

Column (9): Calculate for each subject area the number of FTE (full-time equivalent) faculty required to provide the total number of instructional hours by dividing Column (8) by the number of man hours in a "dental" man year. For the purpose of this exercise use 1,600 hours as the number of man hours in a man year under the assumption that a clinician spends 4 days a week involved in a dental education and 1 day a week in intramural or extramural practice and consultation. (If you believe that another figure more accurately reflects the number of man hours a clinician works, discuss this in the area provided for comments). Enter the results of these calculations in Column (2) of the Summary Worksheet, C-6, Parts A and B.

CLINICAL SCIENCES-1 WORKSH[illegible]

FTE Faculty Needed for Instruction in Pre-Clinical Didactic and Laboratory Subject Areas

(1) Pre-clinical Didactic, and Laboratory Subject Areas	(2) Hours of Instruction by Mode	(3) Average Number of Students Assigned at Any One Time	(4) Number of Students Per Section	(5) Number of Sections Per Mode, Column (3) ÷ (4)	(6) Number of Contact Hours, Column (2) x Column (5)	(7) Total Hours of Preparation and Evaluation	(8) Total Hours Needed for Instruction, Columns (6) + (7)	(9) Number of FTE Faculty for Instruction, Column (8) ÷ 1600

Discussion Area:

C-2 HOW MANY FTE FACULTY ARE NEEDED FOR INSTRUCTION IN SUPERVISED PATIENT CARE CLINICS?

On this worksheet you should calculate the total contact, preparation, and evaluation hours necessary for instruction of dental students during supervised patient care clinics. Once again, the purpose is to isolate instructional activities from other activities in which faculty members engage within a dental education setting.

Column (1): Without specifying an institutional or departmental organizational structure, list the areas of supervised patient care in which a dental student must participate in order to be qualified for the D.D.S. degree. A suggested list includes restorative, periodontics, endodontics, oral surgery, pedodontics, orthodontics, radiology, oral diagnosis, prosthodontics, physical diagnosis, community dentistry, preventive dentistry, hospital dentistry, DAU and TEAM. You may add other clinic experiences, including electives that you believe essential. Do not double count clinics when stipulating DAU and TEAM. Record the supervised patient care experiences in Column (1) and under the appropriate heading in Column (1) of the Summary Worksheet C-6, Part C.

Column (2): Indicate the number of students who should be assigned to a supervised patient care clinic at any one time.

Column (3): Calculate the number of sections needed in each clinical area by dividing 100 (the class size) by Column (2).

Column (4): For each clinical experience, specify the average number of clinical sessions (defined as a 3-hour clinic period) needed per student in supervised patient care situations. (For example, a student may need to treat 25 patients for proficiency in oral surgery and this may take 50 hours of supervision which translates into approximately 17 clinic sessions.) It is recognized that this is only one somewhat artificial approach to calculating instructional time. Indicate any alternative approaches you prefer in the discussion area below.

Column (5): Multiply three (3) hours (the number of hours in a clinic session) by Column (4) to derive the number of hours required per student in each clinic experience.

Column (6): Stipulate the number of faculty members needed to cover a clinic at any one time.

C-2, Continued

Column (7): Multiply Column (3) X Column (5) X Column (6) to compute the total number of contact hours for each clinical area.

Column (8): Estimate the total amount of preparation and evaluation time required by the average faculty member to carry out his role as instructor in each clinical area. In the discussion area, indicate clearly the reasoning by which you arrived at this total. For example, explain in detail how many hours of preparation and evaluation time are needed for each hour of supervised clinic.

Column (9): Add the totals in Column (7) to Column (8) to obtain the total hours needed for instruction in each clinical experience.

Column (10): Calculate for each clinical experience the number of FTE faculty required to provide the total number of instructional hours by dividing Column (9) by the number of man hours in a "dental" man year. For the purposes of this exercise use 1,600 hours as the number of man hours in a man year under the same assumptions specified in Worksheet C-1. Enter the results of these calculations in Column (2) of the Summary Worksheet, C-6, Part C.

Discussion Area: Indicate what percent of a student's clinical experience should be located in extra-mural clinic settings (e.g. mobile settings, neighborhood health centers, etc.).

CLINICAL SCIENCES-2 WORKSHEET

FTE Needed for Instruction in Supervised Patient Care Clinics

(1) Clinical Discipline	(2) Number of Students Assigned to a Clinic at Any One Time	(3) Number of Sections Needed 100 ÷ Column (2)	(4) Average Number of Clinical Sessions Per Student	(5) Number of Hours in Clinical Sessions Per Student 3 hours x Column (4)	(6) Number of Faculty Members Needed to Cover the Clinic at Any One Time	(7) Total Number of Contact Hours Column (3) x Column (5) x Column (6)	(8) Total Hours of Preparation and Evaluation	(9) Total Hours Needed for Instruction Columns (7) + (8)	(10) Number of FTE Faculty for Instruction Column (9) ÷ 1600

Discussion Area:

C-3 WHAT IS THE MINIMUM VIABLE FACULTY SIZE NEEDED IN THE CLINICAL SCIENCES TO CARRY ON A DENTAL EDUCATION PROGRAM AND RELATED ACTIVITIES IN A FREE-STANDING INSTITUTION?

On this worksheet, you should convert FTE (full-time equivalent) faculty to "real" faculty to arrive at a minimum viable faculty size. This calculation recognizes that:

- there is a "critical mass" of faculty needed in each clinical area to ensure coverage of all the major clinical sciences and to provide an adequate intellectual environment.
- faculty members engage in many activities other than those directly related to undergraduate dental education, such as independent research, intra-mural and/or extra-mural practice, public service activities, and teaching graduate students.
- a faculty member's teaching load, preparation time, and other responsibilities may vary.

For the purpose of this worksheet, you should assume that the dental school is a free-standing institution.

Column (1): Enter from the Summary Worksheets, Columns (1) and (2) the FTE faculty needed for dental instruction by clinical subject area.

Column (2) Based on the considerations specified above (and other criteria which you feel are important), calculate what you believe to be the reasonable numbers for viable faculty size in each subject area. Enter this total in Column (3) of the appropriate Summary Worksheet (C-6, Parts A, B, or C).

Column (3): Specify what percent of that faculty can be expected to be full-time faculty members (assuming that full-time is a 4-day teaching week with one day for intra-mural or extra-mural practice) and what portion can be expected to be part-time or volunteer.

Column (4): Explain the reasons for your estimates, in Columns (2) and (3), and what factors caused you to change from the FTE number shown in Column (1).

Discussion Area: Indicate to what extent, if any, and in which clinical areas the minimum viable faculty size would be altered if the institution were in a health sciences setting with other health professions available to participate in clinical teaching.

CLINICAL SCIENCES-3 WORKSHEET

Viable Faculty Size Needed for Education in the Clinical Sciences in a Free-Standing Institution

(1) FTE Needed for Instruction by Clinical Area (from Summary Worksheets Columns (1) and (2)	(2) Viable Faculty Size	(3) Percent Distribution of Viable Faculty by Full-Time, Part-Time, and Volunteer Status	(4) Explanation of Differences Between Columns (1) and (2); Explanation of Rationale for Column (3)

Discussion Area:

C-4 HOW MANY DENTAL AUXILIARY PERSONNEL ARE NEEDED IN THE CLINIC TO SUPPORT THE VIABLE FACULTY SIZE ESTIMATED IN WORKSHEET C-3?

On this worksheet, you should estimate dental auxiliary personnel required specifically for supervised patient care in each clinic (including DAU and TEAM). Central areas such as laboratory, radiology, dispensary, pharmacy, and clerical and financial services are considered in the administrative section.

Column (1): Enter the viable faculty size by clinical experience recorded in Column (3) of your Summary Worksheets, C-6.

Column (2): Estimate the number of clinical auxiliary dental personnel (e.g., hygienists, EDDA's, assistant laboratory technicians and R.N.'s) you believe are necessary to support the faculty size specified in Column (1).

Column (3). Comment on the reasoning behind your estimates of auxiliary personnel.

Discussion area: Your curriculum decisions on how much laboratory work students do themselves, affect the number of laboratory technicians needed in central laboratories. Provide guidance to the Administrative Panel.

CLINICAL SCIENCES-4 WORKSHEET

Clinical Auxiliary Dental Personnel to Support Viable Faculty Size

(1) Viable Faculty by Clinical Experience (from Summary Worksheets, Column 3)	(2) Auxiliary Dental Personnel	(3) Comments

Discussion Area:

C-5 WHAT ARE THE SPACE REQUIREMENTS NECESSARY TO PROVIDE SUPERVISED PATIENT CARE EDUCATION IN THE CLINICAL SCIENCES?

On this worksheet you should provide guidance to the Administrative Panel on those space requirements that affect curriculum development and staff size.

Column (1): Enter the supervised patient care experiences from Part C of your Summary Worksheet, C-6, Column (1).

Column (2): On the basis of the number of students present at any one time in a supervised patient care setting (from Worksheet C-2, Column [2]) estimate the average number of cubicles needed in each discipline at any one time.

Column (3): Estimate the square feet of working space that should be assigned to each cubicle, taking into consideration not only the number of students present at any one time in a clinic, but also the number of auxiliary personnel needed to support dental instruction (from Worksheet C-4, Column 2) -- excluding the x-ray and laboratory technicians under the assumption that they operate in centralized facilities.

In the discussion area, comment on the resource requirements needed to conduct an undergraduate program in hospital dentistry which would meet accreditation standards.

CLINICAL SCIENCES-5 WORKSHEET

Resource Requirements Necessary for Supervised Patient Care Dental Education

(1) Supervised Patient Care Experiences	(2) Average Number of Cubicles Needed per Clinical Area at Any One Time	(3) Square Feet of Worker Space Assigned to Each Cubicle

Discussion Area:

CLINICAL SCIENCES-6 WORKSHEET

Summary Worksheet - Part A
Didactic Clinical Experiences

(1) Didactic Clinical Experiences	(2) Number of FTE Faculty Required for Instruction	(3) Viable Faculty Size Needed for Dental Education

CLINICAL SCIENCES-6 WORKSHEET

Summary Worksheet - Part B
Laboratory Clinical Experiences

(1) Laboratory Clinical Experiences	(2) Number of FTE Faculty Required for Instruction	(3) Viable Faculty Size Needed for Dental Education

CLINICAL SCIENCES-6 WORKSHEET

Summary Worksheet - Part C
Supervised Patient Care

(1) Supervised Patient Care Clinical Experiences	(2) Number of FTE Faculty Required for Instruction	(3) Viable Faculty Size Needed for Dental Education

INTRODUCTION TO ADMINISTRATIVE QUESTIONNAIRE

This section consists of worksheets that deal with the following issues:

AD-1	Costing guidelines for space, equipment, and centralized services
AD-2	Centralized support facilities for a dental school
AD-3	Administrative services of a dental school
AD-4	Student-related activities of a dental school
AD-5	Clinic-related support activities of a dental school
AD-6	Physical resources to support basic sciences instruction
AD-7	Physical resources to support pre-clinical didactic and laboratory subject areas
AD-8	Physical resources to support supervised patient care
AD-9	Space, equipment, and personnel to support an intramural faculty practice
AD-10	Estimates of faculty salaries and total compensation by rank
AD-11	Physical resources to support faculty offices and research laboratories

Although the administrative panel must know the size of the faculty in the basic and clinical sciences in order to determine certain portions of administrative costs, namely space and facilities costs for faculty offices, and faculty research facilities, there are many administrative costs which can be determined before the size of the faculty is derived. Numbers of lecture halls, seminar or conference rooms, and laboratories can be roughly calculated and costed once the student population is determined. Similarly, the determination of the scope and costs of general administration and support facilities can be based on student population assumptions. And it is even possible to agree upon unit cost estimates for faculty offices and research facilities without knowing their exact size.

Thus, we ask that you complete Worksheets AD-1 through AD-10 prior to the seminar and come to the seminar prepared to complete Worksheet AD-11 after the Basic and Clinical Sciences Workshops have determined the size of faculty and support personnel. We would, of course, be delighted should you wish to work through either the Basic or Clinical Sciences faculty questionnaire, complete AD-11 prior to the seminar, and return the entire package to the IOM by the September 5 deadline. Feel free to consult appropriate members of your staff as you answer these questions.

ADMINISTRATIVE QUESTIONNAIRE

AD-1 WHAT ARE THE COSTING GUIDELINES THAT CAN BE APPLIED TO SPACE, EQUIPMENT, AND CENTRALIZED SERVICES OF A DENTAL SCHOOL?

On this worksheet you should specify the general costing assumptions which can be applied to all space, equipment, and centralized service facilities of a dental school except as you might otherwise indicate on individual worksheets. Assume, for the purposes of these calculations, that the dental school being constructed is a free-standing institution with a non-shared basic sciences program, pre-clinical didactic and laboratory programs, and supervised patient-care clinics with the capacity for undergraduate, graduate, and auxiliary dental students. Include oral surgery but only in an out-patient setting.

Row (1): Initial Project Costs: Depreciation of buildings and equipment requires a determination of initial project costs for planning, design and architectural services, construction, interior finishing and operating equipment. Recognizing the geographic differences in the costs of these items, specify the average initial project costs per gross square foot and the ratio of net to gross square feet. Also, specify what poriton of the gross costs are for equipment.

Row (2): Depreciation of Buildings and Equipment: The Office of Management and Budget suggests annual depreciation rates of 7.5% for equipment and 2% for buildings. What do you consider should be the proper mix between buildings and equipment?

Row (3): Utilities, Maintenance and Security: Recognizing regional variations in the cost of providing these services, specify the average yearly cost per gross square foot.

Row (4): Other Direct Operating Expenses: Specify travel, printing, telephones, supplies, etc. as a percent of employees' salaries, or indicate another base.

Row (5): Fringe Benefits: Specify fringe benefits as a percent of employees' salaries.

ADMINISTRATIVE-1 WORKSHEET

Costing Guidelines for Space, Equipment, and Centralized Services

(1) Initial Project Costs

Cost per gross square foot ______________________________

Net to gross ratio ______________________________

Percent of gross for equipment ______________________________

(2) Depreciation of Building and Equipment

Mix between buildings and equipment ______________________________

(3) Utilities, Maintenance, and Security

Average yearly cost per gross square foot ______________________________

(4) Other Direct Operating Expenses

Percent of employees' salaries ______________________________

Other base ______________________________

(5) Fringe Benefits

Percent of employees' salaries ______________________________

Discussion area:

AD-2 WHAT ARE THE CENTRALIZED SUPPORT FACILITIES NECESSARY TO OPERATE A DENTAL SCHOOL?

On the next four worksheets assume that the dental school is capable of operating independently and that it has a comprehensive program of dental education; i.e., it trains auxiliary dental personnel and conducts a graduate program in dentistry. At the end of each subsection you are asked to indicate what portion of the facility under discussion should be charged to undergraduate dental education after total costs have been calculated. For example, in a comprehensive institution, 80% of the total costs of operating a library might be charged to undergraduate dental education and 20% to other programs. You should estimate net internal usable space; it can then be adjusted to gross square feet of space for costing purposes.

Centralized Services

(1) Library - assume, initially, that the dental library is free-standing and provide the responses requested in the first column, then assume that a medical school has been planned with library facilities as indicated (from medical constructed costs seminar), and indicate what additional volumns, personnel, and space would have to be added to accommodate a dental education program.

ADMINISTRATIVE-2 WORKSHEET

Centralized Support Facilities of a Dental School

	Free-Standing Institution	Medical School Library	Dental Education Increment
		(1) LIBRARY	
Number of initial volumes		70,000	
Number of initial journals		2,000*	
Number of new volumes yearly		1,000	
Number of new journals yearly		2,000	
Number of professional employees		5	
Average annual salary		1 @ $25,000; 2 @ $16,000; 2 @ $11,000	
Number of non-professional employees		10	
Average annual salary		$7,500	
Net square feet of space for:			
Stacks		10,000 (for 100,000 volumes)	
Offices		10 @ 120 sq ft	
User seats		150 user seats @ 50 sq ft	
Journal Room		1,500	
Audio-visual library room		1,000	
Work and storage space		2,000	
Entrance, exhibit, front desk		1,000	
Other, specify			
Percent charged to undergraduate dental education			

*10 years of book issues

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(2) Educational Resources Center - specifically designated for the preparation of instructional materials for students (i.e., self-instruction) and faculty. Computer aided instruction, slide-tapes, study guides.

(3) Audio-Visual Services - includes medical illustration services, photography studios, and support services for producing self-instructional materials and teaching aids.

(4) Television Services

ADMINISTRATIVE-2 WORKSHEET

(Page 2)

	(2) Educational Resources	(3) Audio-Visual Services	(4) Television Services
Number of professional employees			
Average annual salary			
Number of clerical employees			
Average annual salary			
Net square feet of space required			
Percent charged to undergraduate dental education			
Extraordinary supply and maintenance costs for audio-visual services			

Fill out the columns for animal quarters and computer operations as indicated in the Worksheet below.

(5) Animal Quarters

(6) Computer Operations - used jointly for academic and business purposes.

ADMINISTRATIVE-2 WORKSHEET

(Page Three)

	(5) Animal Quarters
Number of DVM's	
Average annual salary	
Number of non-professional employees	
Average annual salary	
Number of large animals	
Number of small animals	
Net square feet of space for animal quarters	
Net square feet of space for animal holding rooms	
Percent charged to undergraduate dental education	

	(6) Computer Operations
Size of computer	
Number of computer operators	
Average annual salary	
Number of designers and programmers for academic purposes	
Average annual salary	
Number of designers and programmers for business purposes	
Average annual salary	
Net square feet of space required	
Percent charged to undergraduate dental education	

AD-3 ADMINISTRATIVE SERVICES OF A DENTAL SCHOOL

On this worksheet use the same general assumptions regarding a comprehensive institution as specified in AD-2. Specify the number of employees' salaries and net square feet of space required for all administrative services. Then distribute the employees -- both professional and clerical -- on an FTE basis so as to indicate the approximate staff size required to perform each function.

Administrative services includes the following:

-- Personnel

-- Affirmative Action - activities geared toward the recruitment of women and racial and ethnic minorities.

-- Business and Fiscal Services - includes budget preparation and administration, accounting, purchasing, and payroll.

-- Public Relations and Publications - includes catalogues, bulletins, and announcements directly related to the operation of the institution.

-- Dean's Office

-- Grants (Sponsored Program) Administration

-- Fund Raising

-- Support and Maintenance - includes space for power plant, central telephone switchboard, post office, student health service, repair shops, garages, central xeroxing, locker rooms and lounges, cafeteria.

ADMINISTRATIVE-3 WORKSHEET

Administrative Services of a Dental School

	All Administrative Services
Number of professional employees	
Average annual salary	
Number of clerical employees	
Average annual salary	
Net square feet of space required	
Percent charged to undergraduate dental education	

FTE Distribution of Employees by Function	Professionals	Clerical
Personnel		
Affirmative action		
Business and fiscal services		
Public relations and publications		
Dean's office		
Grants (sponsored program) administration		
Fund raising		
Support and maintenance		

AD-4 STUDENT-RELATED ACTIVITIES OF A DENTAL SCHOOL

On this worksheet use tHe same general assumptions regarding a comprehensive institution as specified in AD-2. Specify the number of employees' salaries and net square feet of space required for all student-realted activities. Then distribute the employees -- both professional and clerical -- on an FTE basis so as to indicate the approximate staff size required to perform each function.

With regard to financial aid to students, discuss what portion of undergraduate students need some form of financial aid and what amount the dental school should budget in providing financial aid to students.

Student-related activities include the following:

-- Admissions Office

-- Registrar's Office

-- Financial Aid Office

-- Student Supply Store

-- Student Alumni Services - student organizations, alumni association newsletter

-- Financial Aid to Students - that aid which is supported by the dental school

ADMINISTRATIVE-4 WORKSHEET

Student-Related Activities of a Dental School

	All Student-Related Activities (Excluding Financial Aid to Students)
Number of professional employees	
Average annual salary	
Number of clerical employees	
Average annual salary	
Net square feet of space required	
Percent charged to undergraduate dental education	

FTE Distribution of Employees by Function	Professionals	Clerical
Admissions office		
Registrar's office		
Financial aid office		
Student supply store		
Student and alumni services		

Financial aid to students	

AD-5 CLINIC-RELATED SUPPORT ACTIVITIES OF A DENTAL SCHOOL

On this worksheet use the same general assumptions regarding a comprehensive institution as specified in AD-2.

Supply the responses requested on each worksheet. Personnel figures should not include auxiliary dental personnel needed to assist at each clinic chair, but only those needed to operate the central service and support areas specified below.

Clinic-related support activities include the following:

-- Central Service Areas - includes patient waiting rooms, registration and screening, records storage, cashier, supplies, clinic management.

-- Central Support Areas - includes radiology, sterilization, dispensary, and medical and oral pathology laboratories. Also may include a professional dental technology laboratory and laboratory facilities for students providing clinic-related services.

ADMINISTRATIVE-5 WORKSHEET

Clinic-Related Activities of a Dental School

	Central Service Areas
Number of professional employees to staff central service clinic areas	
Average annual salary	
Number of clerical and other non-professional employees to staff central service clinic areas	
Average annual salary	
Net square feet of space required	
Percent charged to undergraduate dental education	

ADMINISTRATION-5 WORKSHEET

(Page Two)

	Central Support Areas					
	Radiology	Sterilization	Dispensary	Medical Laboratory	Oral Pathology Laboratory	Dental Technology Laboratory
Number of DDS professional personnel						
Average annual salary						
*Number of technicians						
Average annual salary						
*Number of dental hygienists						
Average annual salary						
*Number of dental assistants						
Average annual salary						
*Number of EDDA's						
Average annual salary						
Number of RN's						
Average annual salary						
Number of clerical personnel						
Average annual salary						
Net square feet required						
Percent charged to undergraduate dental education						

*Consult Clinical Sciences Worksheet C-4, Column (3), for guidance on the numbers of these personnel.

ADMINISTRATION-5 WORKSHEET

(Page Two)

	Central Support Areas					
Number of DDS professional personnel						
Average annual salary						
*Number of technicians						
Average annual salary						
*Number of dental hygienists						
Average annual salary						
*Number of dental assistants						
Average annual salary						
*Number of EDDA's						
Average annual salary						
Number of RN's						
Average annual salary						
Number of clerical personnel						
Average annual salary						
Net square feet required						
Percent charged to undergraduate dental education						

*Consult Clinical Sciences Worksheet C-4, Column (3), for guidance on the numbers of these personnel.

AD-6 BASED ON A CLASS SIZE OF 100, WHAT ARE THE PHYSICAL RESOURCES NECESSARY TO SUPPORT A NON-SHARED BASIC SCIENCES CURRICULUM, ASSUMING SEVEN SUBJECT AREAS: BIOCHEMISTRY, ANATOMY, HISTOLOGY, PHYSIOLOGY, PATHOLOGY, PHARMACOLOGY, AND MICROBIOLOGY?

On this worksheet, estimate, based on a class size of 100, for amphitheatres, lecture halls, seminar and conference rooms, and teaching laboratories respectively:

Row (a): The maximum seating capacity for each type of space.

Row (b): The net square feet needed for each type of space.

When the basic sciences workshop has completed its design of the basic sciences curriculum, including the distribution of instructional time by mode, the estimates provided in this worksheet can be adjusted and calculations made as to the number of rooms needed.

ADMINISTRATIVE-6 WORKSHEET

Physical Resources to Support Basic Sciences Instruction

Type of Space

1. Amphitheatres
    (a) Maximum seating capacity ______
    (b) Net square feet ______
2. Lecture Rooms
    (a) Maximum seating capacity ______
    (b) Net square feet ______
3. Seminar, Conference Rooms
    (a) Maximum seating capacity ______
    (b) Net square feet ______
4. Teaching Laboratories
    (a) Maximum seating capacity ______
    (b) Net square feet ______
5. Other (specify) ______
    (a) Maximum seating capacity ______
    (b) Net square feet ______

AD-7 BASED ON A CLASS SIZE OF 100, WHAT ARE THE PHYSICAL RESOURCES NECESSARY TO SUPPORT THE PRE-CLINICAL DIDACTIC AND LABORATORY SUBJECT AREAS?

On this worksheet estimate, for the following pre-clinical didactic and laboratory subject areas, the number of classrooms and laboratories needed and their size. Enter your estimates in the appropriate place on the AD-7 Worksheet.

The didactic subject areas are as follows: morphology, occlusion, growth and development, behavioral sciences, practice management, clinical disciplines, radiology, preventive dentistry, clinical pharmacology, nutrition, community dentistry, anesthesiology, oral medicine, oral pathology, and cariology.

The laboratory subject areas are as follows: restorative, prosthodontics, endodontics pedodontics, orthodontics, and materials.

If any of the space requirements specified in AD-6 can be used in common with pre-clinical needs, indicate this relationship on the Worksheet.

For ampitheatres, lecture halls, seminar and conference rooms, and laboratories, respectively:

Row (a): Indicate the maximum seating capacity per type of space.

Row (b): Indicate the net square feet of space needed for each type of space.

Row (c): For laboratories only, indicate the cost of student laboratory equipment and specify which portion of this equipment will be purchased by the student.

When the clinical sciences workshop has completed its design of the clinical sciences curriculum, including the distribution of instructional time by mode, the estimates provided in this worksheet can be adjusted and calculations made as to the number of rooms needed.

ADMINISTRATIVE-7 WORKSHEET

Physical Resources to Support Instruction in Pre-Clinical Didactic Classrooms and Laboratories

Type of Space

1. Amphitheatres

   (a) Maximum seating capacity ____________________

   (b) Net square feet ____________________

2. Lecture Rooms

   (a) Maximum seating capacity ____________________

   (b) Net square feet ____________________

3. Seminar, Conference Rooms

   (a) Maximum seating capacity ____________________

   (b) Net square feet ____________________

4. Teaching Laboratories

   (a) Maximum seating capacity ____________________

   (b) Net square feet ____________________

   (c) Cost and percent of clinic instruments student purchases ____________________

AD-8 WHAT ARE THE CLINICAL RESOURCES NECESSARY TO SUPPORT SUPERVISED PATIENT CARE, ASSUMING THE FOLLOWING CLINICAL AREAS: RESTORATIVE, ENDODONTICS, PERIODONTICS, ORTHODONTICS, PEDODONTICS, EMERGENCY, ORAL MEDICINE, ORAL SURGERY, DIAGNOSIS, DAU, TEAM, COMMUNITY DENTISTRY, PREVENTIVE DENTISTRY, PROSTHODONTICS, AND RADIOLOGY?

On this worksheet, you should think in terms of the size of patient-care cubicles, remembering that centralized clinical activities have already been calculated in Worksheet AD-5.

While a large portion of this calculation must necessarily await the judgements of the clinical sciences workshop (see Worksheet C-5), certain preliminary assessments can be made now and adjusted later when the clinical workshop has completed its work.

For each clinical area respectively:

Row (a): Indicate the type of unit design (GD = general dentistry unit; S = specialty unit, e.g., oral surgery unit, preventive unit).

Row (b): Indicate the number of chairs or stations necessary to operate the clinic.

Row (c): Indicate the net square feet per cubicle tacking into consideration the presence of auxiliary dental personnel.

Row (d): Indicate the number and type of auxiliary personnel (e.g., dental assistants, EDDA's, dental hygienists) needed to support each cubicle.

ADMINISTRATIVE-8 WORKSHEET

Size of Supervised Patient Care Clinics

Clinical Area*	Type of Unit	Number of Stations	Net Square Feet/Cubicle	Number of Auxiliary Personnel by Type
Restorative				
Endodontics				
Periodontics				
Orthodontics				
Peditontics				
Emergency				
Oral Medicine				
Oral Surgery				
Diagnosis				
DAU				
TEAM				
Community Dentistry				
Preventive Dentistry				
Prosthodontics				
Radiology				

*If you wish to group any of the clinic areas, use Page Two.

ADMINISTRATIVE-8 WORKSHEET

(Page Two)

Clinical Area	Type of Unit	Number of Stations	Net Square Feet/Cubicle	Number of Auxiliary Personnel by Type

AD-9. HOW MUCH SPACE, EQUIPMENT, AND PERSONNEL ARE NECESSARY TO SUPPORT AN INTRAMURAL FACULTY PRACTICE IN A DENTAL SCHOOL?

On this worksheet you should assume the presence of an intramural practice plan and calculate the space and equipment needed to support it.

Row (1): Indicate the number of stations needed to support an intramural practice. This figure can be modified once the clinical sciences workshop determines faculty size.

Row (2): Specify the net square feet of space per cubicle taking into consideration the presence of auxiliary dental personnel.

Row (3): Indicate the net square feet of additional space needed to operate a central service area (i.e., business office, dental lab, radiology, waiting rooms, etc.) and other central supply areas.

Row (4): Indicate the number of FTE auxiliary personnel and other support personnel needed to operate an intramural practice.

Row (5): Suggest one or several formulas for charging faculty for use of the space and equipment. Indicate also how auxiliary and other support personnel are to be paid.

ADMINISTRATIVE-9 WORKSHEET

Space and Equipment for Intramural Practice

Row (1): Number of stations ____________________

Row (2): Net square feet of space/cubicle ____________________

Row (3): Net square feet of space for central service areas ____________________

Net square feet of space for central supply areas ____________________

Row (4): Number of FTE auxiliary personnel ____________________

Number of other support personnel ____________________

Row (5): Use charge formula and method for paying auxiliary and support personnel

____

____

____

Discussion area:

AD-10. WHAT ARE REASONABLE ESTIMATES FOR FACULTY SALARIES AND FOR TOTAL COMPENSATION OF DENTAL SCHOOL FACULTY AND AUXILIARY PERSONNEL?

Average salaries:	assign salaries to "full-time" faculty and auxiliary personnel taking into consideration rank. Disregard public or private school distinctions.
Average compensation:	estimate the total annual income received by faculty members, including salaries and other forms of compensation (e.g., patient care fees from intra or extramural practice, honorariums, consulting fees). Disregard public or private distinctions.
Discussion area:	Indicate how much of the difference between salary and total income could be derived from intra or extramural fees earned by members of that institution.

ADMINISTRATIVE-10 WORKSHEET

Estimate of Average Full-Time Faculty Salary and Total Compensation, by Rank
(12-Month Year)

	Average Salary	Average Compensation	Discussion
Basic Sciences			
Professor			
Associate			
Assistant			
Instructor			
Clinical Sciences			
Professor			
Associate			
Assistant			
Instructor			
Auxiliary Personnel			
Dental Assistant			
Expanded Duty Dental Auxiliary (EDDA)			
Basic Sciences Research Assistant			

AD-11. WHAT ARE THE SPACE AND EQUIPMENT REQUIREMENTS FOR FACULTY OFFICES AND RESEARCH LABORATORIES IN THE BASIC AND CLINICAL SCIENCES?

Row (1): Indicate the net square feet of space needed for faculty offices, including space for clerical staff and necessary conference rooms per department.

Row (2): Indicate the net square feet of research laboratory space necessary to support faculty research and technicians. Assume that the basic sciences program is non-shared.

ADMINISTRATIVE-11 WORKSHEET

Row (1): Net square feet of space/faculty offices ______________________

Net square feet of space/departmental conference rooms ______________________

Row (2): Net square feet of space for faculty research laboratories ______________________

Discussion Area:

BASIC SCIENCES-1 WORKSHEET

Number of Hours of Faculty Time Needed for Instruction of Dental Students in the Basic Sciences

(1) Subject Areas	(2) Hours of instruction by mode		(3) Number of sections per 100 students	(4) Total hours of direct faculty contact time for instruction Column (2) x Column (3)	(5) Total hours of preparation and evaluation needed for instruction		(6) Total hours of faculty time for instruction Column (4) + Column (5)
Anatomy	Lecture	70	1	70	Lecture	140	210
	Demonstration	30	2	60	Demonstration	60	120
	Laboratory	210	5	1,050	Laboratory	2,625	3,675
		310		1,180		2,625	4,005
Histology	Supervised self-instruction	30	1	30	Supervised self-instruction	60	90
	Seminar	18	10	180	Seminar	180	360
	Laboratory	30	5	150	Laboratory	750	900
					Practical exams	10	10
		78		360		1,000	1,360

SAMPLE

SAMPLE

Discussion Area:
Lecture = 2 hours preparation time/session
Demonstration = 1 hour of set-up time/session
Programmed slide-tape = 2 hours of preparation/1-hour program

BASIC SCIENCES-2 WORKSHEET

Number of FTE Faculty Needed for Dental Education

(1) Total hours of faculty time for instruction by subject area (from Summary Worksheet, B-6 Columns 1 & 2)	(2) FTE faculty needed to provide instruction Column (1) ÷ 2000	(3) Non-contact faculty hours for dental education			(4) Total hours of non-contact faculty time Columns (3a) + (3b) + (3c)	(5) Total hours of faculty time for dental education Column (1) + Column (4)	(6) FTE faculty needed for dental education Column (5) ÷ 2000
		(a) Research	(b) Administration	(c) Other			
Anatomy 4,005	2.0	100	60	--	160	4,165	20.8

SAMPLE

SAMPLE

Discussion Area:

BASIC SCIENCES-3 WORKSHEET

Viable Faculty Size for Dental Education Program in the Basic Sciences in a Free-Standing Institution

(1) FTE faculty for a dental education program, by subject area (from Summary Worksheet, B-6, Columns 1 & 3)	(2) Viable faculty size needed for dental education program	(3) Explanations for differences between Columns (1) and (2)
Anatomy 2.0	5 -- 3 FT 2 PT*	Need separate people for gross, head and neck, and neuro. Need 1 person/laboratory section. Need core faculty to provide continuity of teaching program.
SAMPLE		SAMPLE

Discussion Area:

* 2 PT in anatomy can be oral surgeons or surgery residents.

BASIC SCIENCES-4 WORKSHEET

Viable Faculty Size for Dental Education Program in the Basic Sciences in a Health Sciences Center

(1) FTE Faculty for a Dental Education Program, by Subject Area (from Summary Worksheet, B-6, Columns 1 and 3)	(2) Viable Faculty Size Needed for Dental Education Program in a Free-Standing Institution	(3) Viable Faculty Size Needed for Dental Education Program in a Health Sciences Center	(4) Explanation for Differences Between Columns (1) and (3) and Columns (2) and (3)
Anatomy 2.0 SAMPLE	5	4	Can get medical school to teach neuroanatomy. SAMPLE

Discussion Area:

BASIC SCIENCES-5 WORKSHEET

Number of Clerical and Technical Support Personnel

(1) Faculty Size by Subject Area (from Summary Worksheet B-6, Columns (1) and (4)		(2) Number of Clerical Personnel	(3) Number of Technical Personnel	(4) Discussion Area
Anatomy	5	1	3	Need 3 lab technicians for faculty research program and preparation of teaching and demonstration materials Need 1 departmental secretary
SAMPLE				SAMPLE

Discussion Area:

Same needs in health science center

BASIC SCIENCES-6 WORKSHEET

Summary Worksheet

(1) Subject Areas (from B-1, Column 1)	(2) Total Hours of Faculty Time for Instruction (from B-1, Column 6)	(3) Number of FTE Faculty Needed for Dental Education (from B-2, Column 6)	(4) Viable Faculty Size Needed in a Free-Standing Institution (from B-3, Column 2)	(5) Viable Faculty Size in a Health Sciences Center (from B-4, Column 3)
Anatomy SAMPLE	4,005	2.08 SAMPLE	5: 3 FT 2 PT	4: 2 FT 2 PT

CLINICAL SCIENCES-1 WORKSHEET

FTE Faculty Needed for Instruction in Pre-Clinical
Didactic and Laboratory Subject Areas

(1) Pre-clinical Didactic, and Laboratory Subject Areas	(2) Hours of Instruction by Mode	(3) Average Number of Students Assigned at Any One Time	(4) Number of Students Per Section	(5) Number of Sections Per Mode, Column (3) ÷ (4)	(6) Number of Contact Hours, Column (2) x Column (5)	(7) Total Hours of Preparation and Evaluation	(8) Total Hours Needed for Instruction, Columns (6) + (7)	(9) Number of FTE Faculty for Instruction, Column (8) ÷ 1600
Periodontics	Lecture 60	100	100	1	60	120	180	
	Seminar 90	50	10	5	450	225	675 855	0.53
Materials	Lecture 60	100	100	1	60	120	180	
	Lab* 60	100	10	10	600	200	800 980	0.61

SAMPLE

SAMPLE

Discussion Area:

Laboratory* = 1 hour needed for grading technical work per 3 hours of lab.

CLINICAL SCIENCES-2 WORKSHEET

FTE Needed for Instruction in Supervised Patient Care Clinics

(1) Clinical Discipline	(2) Number of Students Assigned to a Clinic at Any One Time	(3) Number of Sections Needed 100 ÷ Column (2)	(4) Average Number of Clinical Sessions Per Student	(5) Number of Hours in Clinical Sessions Per Student 3 hours x Column (4)	(6) Number of Faculty Members Needed to Cover the Clinic at Any One Time	(7) Total Number of Contact Hours Column (3) x Column (5) x Column (6)	(8) Total Hours of Preparation and Evaluation	(9) Total Hours Needed for Instruction Columns (7) + (8)	(10) Number of FTE Faculty for Instruction Column (9) ÷ 1600
Endodontics	20	5	4	12	2	120	0	120	0.08

SAMPLE

SAMPLE

Discussion Area:

CLINICAL SCIENCES-3 WORKSHEET

Viable Faculty Size Needed for Education in the Clinical Sciences in a Free-Standing Institution

(1) FTE Needed for Instruction by Clinical Area (from Summary Worksheets Columns (1) and (2)	(2) Viable Faculty Size	(3) Percent Distribution of Viable Faculty by Full-Time, Part-Time, and Volunteer Status	(4) Explanation of Differences Between Columns (1) and (2); Explanation of Rationale for Column (3)
Endodontics 0.04	3	33% FT 67% PT	No faculty member should have to spend more than 3 sessions per week on the clinic floor 67% PT -- It is very difficult to get full-time specialists. PT bring the realism of practice to the students
SAMPLE			SAMPLE

Discussion Area:

CLINICAL SCIENCES-4 WORKSHEET

Clinical Auxiliary Dental Personnel to Support Viable Faculty Size

(1) Viable Faculty by Clinical Experience (from Summary Worksheets, Column 3)	(2) Auxiliary Dental Personnel	(3) Comments
Endodontics 3	1 DA	Needed to prepare special tray set-ups and assist students on endo. elective doing apicoectomies
SAMPLE		SAMPLE

Discussion Area:

CLINICAL SCIENCES-5 WORKSHEET

Resource Requirements Necessary for Supervised Patient Care Dental Education

(1) Supervised Patient Care Experiences	(2) Average Number of Cubicles Needed per Clinical Area at Any One Time	(3) Square Feet of Worker Space Assigned to Each Cubicle
Endodontics SAMPLE	20	100 SAMPLE

Discussion Area:

CLINICAL SCIENCES-6 WORKSHEET

Summary Worksheet - Part A
Didactic Clinical Experiences

(1) Didactic Clinical Experiences	(2) Number of FTE Faculty Required for Instruction	(3) Viable Faculty Size Needed for Dental Education
Periodontics	0.53	*Covered by clinical faculty
SAMPLE	SAMPLE	

CLINICAL SCIENCES-6 WORKSHEET

Summary Worksheet - Part B
Laboratory Clinical Experiences

(1) Laboratory Clinical Experiences	(2) Number of FTE Faculty Required for Instruction	(3) Viable Faculty Size Needed for Dental Education
Materials SAMPLE	0.61	10 SAMPLE

CLINICAL SCIENCES-6 WORKSHEET

Summary Worksheet - Part C
Supervised Patient Care

(1) Supervised Patient Care Clinical Experiences	(2) Number of FTE Faculty Required for Instruction	(3) Viable Faculty Size Needed for Dental Education
Endodontics	0.04	3
SAMPLE	SAMPLE	

Attachment 6 to Chapter 2

Participants in Constructed Costs Seminars in Medicine, Dentistry, and Veterinary Medicine

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

INSTITUTE OF MEDICINE
STUDY OF COSTS OF
EDUCATING HEALTH PROFESSIONALS

CONSTRUCTED COSTS SEMINAR FOR MEDICINE, July 10-13, 1973

Seminar Chairman

Dr. Merlin K. DuVal, Vice President for Health Sciences, University of Arizona

Steering Committee Members

Dr. Julius Richmond (Chairman), Director, Judge Baker Guidance Center, Boston

Mr. James F. Kelly, Executive Vice Chancellor, State University of New York, Albany

Dr. Alvin L. Morris, Vice President for Administration, University of Kentucky

Dr. Daniel Tosteson, Professor and Chairman, Department of Physiology and Pharmacology, Duke University Medical Center

Invited Participants

Dr. Sam L. Clark, Professor and Chairman, Department of Anatomy, University of Massachusetts, Worcester

Dr. William R. Drucker, Dean, School of Medicine, University of Virginia

Mr. A. Russell Hanson, Chairman, Division of Education, Department of Administration, Mayo Foundation

Dr. Edgar Lee, Associate Dean, School of Medicine, Case Western Reserve University

Invited Participants (continued)

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- Dr. Robert G. Petersdorf, Chairman, Department of Medicine, School of Medicine, University of Washington
- Dr. Edmund D. Pellegrino, Vice President for the Health Sciences, Director of the Center, School of Medicine, State University of New York at Stony Brook
- Dr. Helen M. Ranney, Chairman, Department of Medicine, School of Medicine, University of California, San Diego
- Dr. Edwin F. Rosinski, Professor, School of Medicine, Office of Health Sciences Education, University of California, San Francisco
- Dr. David C. Sabiston, Chairman, Department of Surgery, School of Medicine, Duke University
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STUDY OF COSTS OF
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Invited Participants

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Dr. George C. Christensen, Vice President for Academic Affairs, Iowa State University
Dr. Clarence R. Cole, Professor, Department of Pathology, College of Veterinary Medicine, Ohio State University
Dr. Joseph Pierce, Head, Section on Laboratory Animal Medicine and Surgery, National Heart and Lung Institute
Dr. Charles G. Rickard, Associate Dean, New York State Veterinary College, Cornell University
Dr. Michael J. Shively, Department of Veterinary Medicine, Purdue University

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